Newsletter of the Colorado Native Plant Society

Aquilegia

Volume 38, No. 5 Winter 2014

Aquilegia: Newsletter of the Colorado Native Plant Society

Dedicated to furthering the knowledge, appreciation, and conservation of native plants and habitats of Colorado through education, stewardship, and advocacy

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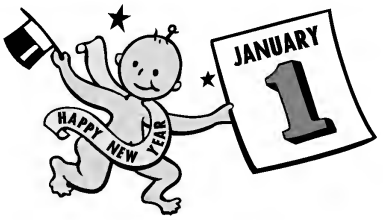
Inside this issue

Botanicum absurdum by Rob Pudim

Cover Photo *Asclepias incarnata* © Jim Borland

The Year in Review 2014

Another year has come and gone, and CoNPS, its chapters, and committees have many activities to show for it. Thank you, CoNPS members, for your support of CoNPS and thanks to the many volunteers who contribute so much of their time to make a difference for native plants and their habitats.



Last winter, an advocacy survey went out to members. There was a 35% response rate. Ninety-five percent of those who responded agreed that CoNPS should become a stronger advocate for native plants. The Board has been discussing strategies for involving the Society in more advocacy activities and will be reporting back to the membership with ideas in early 2015.

Our message this year is to become involved as a volunteer in CoNPS. Many new, interesting volunteer opportunities will become available in 2015. Whether you enjoy teaching, field work, gardening, or writing, we will have something to interest you. CoNPS will be celebrating its 40th Anniversary in 2016. Let's work hard to prove that CoNPS has made a difference!

The issues discussed at the Board of Directors meetings can be read in the Board report on page 5. Changes in Board membership have taken place over the past year. After 3 years as CoNPS president, Crystal Strouse stepped down and Charlie Turner became the new president of the Board. Vice President Bernadette Kuhn gave birth to Benjamin, so she didn't have time for her role on the CoNPS Board. Irene Shonle joined the Board as Vice President. Denise Wilson continues as CoNPS Secretary and Mo Ewing continues as Treasurer. Charlie Turner's paid job as a scientist with AECOM became extremely busy this year so Jan Loechell Turner became co-president to help with the CoNPS workload. Erin Tripp, Lenore Mitchell, and Jessica Smith became new members-at-large of the Board in October 2013, joining Jenny Ramp Neale, Betsy Bultema, Steve Olson, and Jan Loechell Turner. We were all delighted when Bob Powell rejoined the Board as a voice for the Southwestern part of our state. Bob is quite an activist, devoting much time to environmental issues in his region.

Judy King's Golden Gate Canyon Field Trip
Photo by Erin Tripp

After a year on the Board, Erin Tripp resigned because of time constraints. While she served on the Board, she was a very active participant and we will miss her. Her seat on the Board will not be filled until the Fall elections, so if you are interested in a position on the Board, please contact Vice President Irene Shonle. After over 9 years on the Board, Megan Bowes, chair of the Horticulture and Restoration Committee, resigned. She has been a very active and dynamic member of the Board. To read about her contributions to CoNPS, see page 8.

We said farewell to Linda Hellow, who did an outstanding job bringing a large variety of workshops to CoNPS as the chair of the Workshop Committee. Ronda Koski was selected as the new Workshop Committee Chair and has done an excellent job bringing workshops to all areas of the state. The members from the Western Slope and those outside the Denver Metro area have been appreciative of the workshop offerings available to them. This has also meant that Ronda has traveled the state to supervise the workshops. The topics have included restoration, ethnobotany, *Phacelia & Aliciella*, grass identification, native plant landscaping, and the sunflower family. Steve Popovich and Melissa Islam developed a new workshop, How to Collect Native Plants.

Members also took advantage of workshop offerings of other organizations such as the Riparian Restoration series run by the Tamarisk Coalition and the Wetland Plant Identification Course offered by the Colorado Natural Heritage Program and taught by Denise Culver.

Due to time pressures as a student, Aaron Davenport was no longer able to serve as CoNPS webmaster. We are grateful to Aaron and his predecessor, Yongli Zhou, for the many hours they devoted to the CoNPS website. Fortunately, Sally Dunphy volunteered to become the webmaster and hit the ground running. Linda Smith serves as the web editor, formatting and proofreading items for the website before passing them on to Sally.

The CoNPS Chapters were very active this year, offering more than 45 field trips throughout the state. This was probably an all time record! We are grateful to the chapters, the people who organized the field trip schedules, and those who led the field trips.

Charlie Turner and Mikl Brawner at the plant sale and seed swap at Dave Sutherland's

CoNPS collaborated with the Front Range Wild Ones in their Native Plant Seed Swap and their Native Plant Sale, spearheaded by Susan Crick Smith, Linda Hellow, and Megan Bowes. The FRWO also held native plant landscape tours. Another collaboration took place when CoNPS participated with the Wildlands Restoration Volunteers in their Purge the Spurge event. A big thanks goes to Megan Bowes, Chair of the Horticulture and Restoration Committee, who helped to coordinate these and other events.

Collaboration (Reaching Out: Synergy Through Collaboration) was the theme of the 2014 CoNPS Annual Meeting October 3-5 in Fort Collins, attended by 100 CoNPS members. Dan Gluesenkamp, Executive Director of the California Native Plant Society (CNPS), was the keynote speaker, informing us of the projects of CNPS and giving us ideas for what CoNPS might do. The Colorado Rare Plant Symposium took place on October 3 followed by the Friday Night Social at the Rio Grande Mexican Restaurant. There were a number of choices of Sunday field trips. We are appreciative to the Northern Chapter for their hard work making the Annual Meeting a success and to Jill Handwerk and the Rare Plants Technical Committee for the Colorado Rare Plant Symposium. There is a report on the meetings in the Fall 2014 issue of *Aquilegia*.

Dan Gluesenkamp and Dave Anderson at the CoNPS Annual Meeting

We are grateful that Linda Smith continues as the CoNPS Administrative Assistant. Linda was hired in 2008. She is involved in almost every area of CoNPS, serving as the contact for phone calls, letters, and emails, maintaining the membership database, overseeing renewals and new memberships, enrolling members for workshops and the annual meeting, attending Board meetings, running the online CoNPS Bookstore, serving as web editor, and proofreading *Aquilegia* to name just a few of her duties. In addition to her other skills, Linda is a talented artist and photographer and is working on a native plant coloring book to interest young budding botanists.

Field studies in 2014 included a bioblitz in Cimarron National Grasslands and another in the Rampart Range Wildlands. Field Studies Chair, Steve Popovich, has reported some exciting news. See page 12.

Penstemon hallii Photo by Loraine Yeatts

The winners of the 2014 CoNPS photo contest were celebrated on our website and in the Fall 2014 issue of *Aquilegia*. CoNPS is fortunate to have so many members with outstanding talent as photographers. In order to better appreciate the photographs of our members, two additional photograph categories (Artistic Category, Native Plants & Wildlife Category) were added to the original two categories, Native Plant Category and Native Plant Landscape Category.

The CoNPS Native Plant Garden Guides Committee was formed and has started work on native plant guides for a number of regions of the state. The guides will include information on easy-to-grow Colorado native plants appropriate for Colorado gardens in each region, how to plant them and care for them, and landscape plans for a native plant garden for your yard. The committee will also produce a two-sided color handout on native plants for pollinator gardens. Irene Shonle, CoNPS Vice President, is chairing this ad hoc committee. This collaborative project includes members from CoNPS, CSU Extension's Native Plant Master Program, the High Plains Environmental Center, the Front Range Wild Ones, and the Butterfly Pavilion.

Our message this year is to become involved as a volunteer in CoNPS. Many new, interesting volunteer opportunities will become available in 2015. Whether you enjoy teaching, field work, restoration work, gardening, or writing, we will have something to interest you. Often, in volunteer organizations, there is only a small group of people who are actively involved in the operation and activities of the group. We do not want CoNPS to be like that. If we each take on a little bit, we can make a huge difference. We really want to expand our outreach efforts in 2015 and beyond. Let's work harder to reach the schools, colleges, garden centers, and the general public. Let's connect with each other. We have similar interests and goals. It is fun to work together as a community to educate others about native plants and their environment and to help in the conservation of native plants and their habitats. Please become active in CoNPS this year. A list of opportunities will be sent out in the first part of 2015.

This year CoNPS gave a total of $7,745 to projects furthering CoNPS' mission. Thank you for making this possible through your memberships and donations!

WHAT HAS CONPS FUNDED THIS YEAR?

Every year the Colorado Native Plant Society awards funding to projects that promote the mission of the Society. These include projects the Board votes to fund with surplus money earned from the Annual Meeting, book sales, workshops, etc. It also includes research grants funded through yearly interest earned by the John Marr Fund and the Myrna Steinkamp Fund. Your membership dues and donations help make the funding of these projects possible. This year CoNPS gave a total of $7,745 in general funds and research grants. Thanks for making this possible through your generous support! If you would like to make contributions to CoNPS, please contact Mo Ewing, CoNPS Treasurer, at bayardewing@gmail.com.

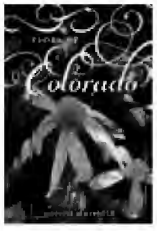
General Funding (Mission Grants) 2014 - $4,000

(Awarded by CoNPS Board of Directors)

The Colorado Natural Heritage Program received **$2,000** to hire a student for database entry of plant records.

Janet Wingate received **$500** to help with the purchase of illustrations for her book on *Carex*.

Larimer County Natural Resources received **$500** to help fund the publication of their new guide, *Wildflowers and Other Plants of the Larimer County Foothills Region.*



Jennifer Ackerfield received a **$1,000** donation to help with printing costs of *Flora of Colorado*. CoNPS has also helped promote the book with a publicity campaign encouraging members to pre-order copies and to donate to the *Flora of Colorado* Fund. See page 22.

Research Grant Awards 2014 - $3,745 (Awarded by Research Grants Committee, Catherine Kleier, Chair)

John W. Marr Fund

Goodrich, Amy (student of David Cooper working on MS in Forest and Rangeland Stewardship, Colorado State University). Evaluating the reestablishment of vegetation on disturbed high mountain lakeshore areas re-exposed by dam removal in Rocky Mountain National Park, Colorado. **$500**

Stuemky, Andrea (student of Catherine Kleier, working on BS in Biology at Regis University). Continuation of trail restoration monitoring and plug succession rates on Mount Yale Collegiate Peaks Wilderness, CO. **$750**

Zorio, Stephanie (student of Charles Williams, working on MS in Biological Sciences, Idaho State University, Pocatello, ID). Using historical data to document 65 years of vegetation change in high- elevation communities of the upper East River Basin, Colorado, USA. **$1000**

Myrna P. Steinkamp Fund

McMinn, Robby (student of Leland Russel, working on MS in Biological Sciences, Wichita State University, Wichita, KS) Demographic and genetic variability throughout the range of two thistle species (*Cirsium canescens* Nutt. and *Cirsium ownbeyi* S.L. Welsh) **$945**

Kittel, Gwen (Professional Botanist, NatureServe) in conjunction with **Tim Hogan** (Collections Manager, Botany/Herbarium, University of Colorado Museum of Natural History) Survey and update Colorado population of *Salix arizonica* and conduct systematic survey for additional populations in 2014 field season. **$550**

*Cirsium canesens.*USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An *illustrated flora of the northern United States, Canada and the British Possessions.* 3 vols. Charles Scribner's Sons, New York. Vol. 3: 552.

News from the 2014 CoNPS Board of Directors Meetings

The CoNPS Board met less frequently than usual in 2014 and it was decided that this new model did not work well and that the Board would meet at least 4 times in 2015. What follows below is a summary of motions passed and discussions that took place during the Board meetings on February 1, November 1, and December 6, 2014.

Advocacy

The Board has been discussing the role of CoNPS and how we can become more involved in advocacy. The idea of a paid advocacy coordinator to keep chapters up-to-date on local issues and help them to organize volunteer groups to work locally was considered and a job description was written. Another idea was to collaborate with other organizations that are advocates for native habitats. The Conservation Committee has been approaching other organizations about possible collaboration.

Mission Grants

We will now have mission grants in addition to research grants. In the past, funding requests for books and projects have been voted on by the Board as requests have been received. In order to publicize the funding and give applicants an equal chance at receiving funding for their projects, mission grants will be awarded twice per year. Guidelines have been written and a committee will be formed.. CoNPS is expected to be able to give approximately $2,000 annually. Deadlines for mission grant requests will be announced in *Aquilegia* and on the CoNPS website and guidelines will be posted on the website.

Colorado State Land Board (SLB) proposed stewardship trust realignment

The Colorado State Land Board (SLB) is proposing a realignment of stewardship trust land, so the Board invited Mindy Gottsegen, Conservation Services Manager for the Colorado State Land Board, and Carol English, Biologist for the Colorado State Land Board, to the Board meeting. Mindy's Power Point presentation gave the background of the stewardship trust and Mindy answered questions about how the realignment process works. The CoNPS Board was favorably impressed with the process and made written suggestions to the SLB regarding specifics of the proposed realignment.

Status report on Black Forest logging and plant survey inventory request

CoNPS member Judy von Ahlefeldt approached the CoNPS Board with her concerns about the post-fire logging of the Black Forest at Pineries Open Space. After discussion, the Board sent a letter to El Paso County regarding the Pineries Open Space Forest Management Plan Draft offering the services of our members to assist in the location and identification of State rare species, and requesting further notification on the opportunity to comment. The Board was asked to send a proposal with other interested parties. CoNPS, the Denver Botanic Gardens Research Department, and the Colorado Natural Heritage Program submitted the proposal with Judy von Ahlefeldt in January.

Annual Conference Committee established

Every year, one of the chapters of CoNPS has been in charge of putting on the CoNPS Annual Meeting. Normally, there is an alternation between the East Slope and West Slope. Our feedback from the chapters is that this can be an overwhelming task. It is especially difficult for the chapters that do not have many members. By establishing a permanent Annual Conference Committee, experience and expertise will be passed on from year to year and the chapters will not have to reinvent the wheel every year.

Native Plant Master ® Program asked for Volunteer Help from CoNPS Designing Native Plant Garden Plans

The CSU Extension Native Plant Master (NPM) Program is applying for a National Science Foundation grant to produce and print Colorado native plant garden plans and asked CoNPS to write a letter of support for the grant, stating that CoNPS would supply volunteers to create landscape designs using native plants. It was determined that a number of members were willing to volunteer and CoNPS agreed to write a letter of support.

Native Plant Gardening Guides

This request from the NPM program for garden plans prompted a revisiting of the idea of native plant gardening guides, a project that the CoNPS Board had discussed in 2008. It was decided to combine the NPM native garden plans with the native plant selection guides as a collaboration between CoNPS, the NPM program, Denver Botanic Gardens, Front Range Wild Ones, High Plains Environmental Center, and the Butterfly Pavilion.

Membership Drive

Membership has been dwindling and CoNPS still has much to accomplish. Linda Smith has been the lone member of the Membership Committee since Eric Lane stepped down as committee chair. As part of her duties as the CoNPS Administrative Assistant, Linda is in charge of new memberships, renewals, and maintaining the database of members. Linda does not have the time to lead a membership drive in addition to her other duties. We will enlarge the committee and find a Membership Committee chair to help coordinate the membership drive.

Membership Rates

The Board voted to change the lifetime membership rate from $300 to $800. The new rate is more in line with other native plant societies of a similar size. The Native Plant Society of New Mexico charges $1,000 for lifetime memberships. The membership category rates were increased $5 each in a separate email vote in February.

Requests for Book Funding

Jennifer Ackerfield requested funding to help with the printing of her *Flora of Colorado* book. The Board voted to donate $1,000 and to help publicize the pre-order of the book and a fund raising campaign.

Janet Wingate requested funding to purchase illustrations for her *Carex* book and the Board voted to donate $500 toward funding this request.

2014 Annual Meeting Financial Report

Mo Ewing presented the Balance Sheet, Budget to Actual figures, and the Annual meeting finance report. He reported a $3,216 net income year-to-date, largely due to the Annual Meeting. Donations from sponsors provided significant help. Declining membership is a critical issue. This is a trend. The Board discussed building CoNPS membership. We need more outreach to young people, students, and other organizations.

2015 Board Meeting Schedule

January 10, 2015	October 24, 2015
May 30, 2015	December 5, 2015
August 8, 2015	

Meetings are held from 9:30 a.m. – noon at the Tracy Room of Dayton Memorial Library, Regis University, 3333 Regis Blvd., Denver, CO 80221. Members are welcome to attend.

CoNPS Board Meeting Summary January 10, 2015

Announcements

Jim Tolstrup is the new chair of the Horticulture & Restoration Committee. Sara Copp is the new chair of Education & Outreach Committee. Bob Powell announced the passage of the Hermosa Creek Watershed Protection Act.

Advocacy

The Board continued to discuss the proposed advocacy coordinator position. It was decided that currently we do not have the resources or enough support from the chapters to pursue this option. There were concerns about being able to fund a permanent position in light of the declining number of members. Before we can afford to support the advocacy position, we need to strengthen CoNPS, increase our membership and financial base, and bring in a greater diversity of members. This will involve a membership drive, advertising our events to the community and organizations with interests that overlap ours, improving communication among the Board, committees, chapters, and members, and organizing volunteers to work to achieve the CoNPS mission.

Membership & Development Coordinator

As a result of the advocacy discussion and the concern about falling membership numbers and younger people being under-represented in CoNPS, a committee was formed to come up with a proposal for a new position, a Membership & Development Coordinator, who would spearhead the membership drive and facilitate communications within CoNPS and outside, advertising our events to non-members.

2015 Budget

Mo Ewing presented the 2015 budget and it was approved.

Committee Chairs Become Voting Members

In the past, the standing committee chairs were non-voting members of the CoNPS Board of Directors. A motion was passed to make standing committee chairs voting members.

OPPORTUNITIES TO BECOME INVOLVED!

Here is something for your New Year's resolution list. Become more active in CoNPS. You will receive more than you give.

Get more out of your CoNPS membership by participating on a committee, joining a weed-pull, or serving on the Board. Participating in a community is good for mental, emotional and physical health and most CoNPS members already attend workshops, programs, and field trips. Why not take it a step further to apply your problem-solving skills on behalf of native plants? Develop your planning and leadership skills with a like-minded group that shares your interest in native plants. Your accomplishments with CoNPS could even enhance your resume or CV. It doesn't matter where you live. We can communicate by email and phone.

Chair a Committee:

Chairs are needed for the Annual Conference Committee, Membership Committee, and Mission Grants Committee.

Join a Committee:

Annual Conference, Conservation, Education & Outreach, Horticulture & Restoration, Media (newsletter, website, social media), Membership (membership drive), Mission Grants, Research Grants, Sales, or Workshops Committee are choices.

Become Active in Your Chapter

The Southeast Chapter needs a president. All chapters can use your help in planning programs and field trips. We urge to to become more active in CoNPS. For more information or to volunteer, contact Jan L. Turner at JLTurner@regis.edu.

News & Announcements

High Plains Environmental Center (HPEC) Donates Native Seeds for CoNPS Members

Isn't it wonderful when you received an unexpected gift? This has now happened to you and to CoNPS. High Plains Environmental Center (HPEC) has designed, printed, and donated seed cards for all new and renewing CoNPS members. The cards are intended to promote the use of native plants and include a packet of wildflower seeds that were collected in Larimer County. Look for them along with your membership renewal.

Don't Miss the HUGE Native Plant Sale at HPEC on May 16

HPEC grows native plants on a large scale in their nursery, at 2968 Bluestem Willow Drive, in Loveland. HPEC will be opening their nursery to the public, on May 16, 2015, for a huge, one day, native plant sale, as well as unveiling native plant demonstration gardens that have been in development since 2012.

Jim Tolstrup

Photo courtesy HPEC

Jim Tolstrup, Executive Director of HPEC, is on the Board of the Colorado Native Plant Society. For information on HPEC, see http://suburbitat.org/

Message from Jeanne Willson of the Denver Chapter: Camp Out Coming!

We can't wait until summer! We'll be enjoying the SECOND annual campout of the Denver Group of CoNPS. Our probable weekend dates will be July 24th through 26th. Last summer we visited the fen in Geneva Basin on Saturday and hiked to lovely Shelf Lake on Sunday. This year again, we'll have an easy day and a moderate/long day of hiking and botanizing somewhere wonderful. Last year it rained both days; this year, well, I won't promise dry days but I will promise fun and camaraderie. We will have live music. We will have rain shelters. We will camp in a campground. We may have an evening a few weeks before the trip to learn about camping gear and how to use it. We'll help you rent a good tent and sleeping bag at REI and teach you how to set it up and keep yourself dry. And we'll have botany! We haven't decided yet, but we may go somewhat south so we can learn some new plants. Or we may go to Missouri Lakes, south of Minturn, to visit some new areas. We hope that people from different CoNPS groups can join us. So please let me (riversong@centurylink.net) and/or Cheryl Ames or other folks from CoNPS know about this opportunity to experience our mountains ... with our friends!

CoNPS 2015 Annual Conference & Colorado Rare Plant Symposium

September 11-13, 2015

American Mountaineering Center, Golden, CO

Mark your calendars! The 2015 CoNPS Annual Conference will take place September 11-13, 2015, in Golden, Colorado. This will be an all CoNPS Annual Conference without a chapter affiliation. We will coordinate carpooling from around the state and find host homes with guest rooms for those on a limited budget.

Because of the hardship that the Annual Conference planning places on chapters, the CoNPS Board voted to re-vamp the way that annual conferences are planned. A Board Committee was formed to help locate a venue, food, lodging, speakers, and motels for Annual Conferences. The Chapters will decide the theme and also make any decisions they want to on the venue, etc. but the CoNPS Annual Conference Committee will help provide support and labor to make the planning more manageable for the hosting chapters.

Opportunity to become an Annual Conference Committee Member

Are you interested in becoming a "joiner"? Join our Annual Conference Committee. It isn't a one time deal. Our committee will become expert at putting on the Annual CoNPS conferences from year to year and location to location. This year the meeting will be in Golden, the 2016 conference will be in Grand Junction, and the 2017 conference will be in Denver. We need enthusiastic people who enjoy working with a group. If you haven't been involved in planning and putting on a conference, you will learn new skills. You don't need to live near the meeting site to be a committee member.

The Many Contributions of Megan Bowes

If you have been a member of CoNPS for any length of time, you are very likely to know Megan Bowes, who has been an extremely dynamic member of the CoNPS Board. Megan has resigned as chair of the Horticulture & Restoration Committee. She has served on the CoNPS Board since 2005 and her amazing energy and enthusiasm have benefited CoNPS greatly.

Megan became Education and Outreach Committee Chair in 2005 and recruited volunteers to staff outreach booths, developed presentations, advertised meetings and workshops, and provided the public with educational information and membership brochures. Throughout her time with CoNPS, she has presented a number of talks, workshops, and hikes, helped

with annual meetings, and recruited members to staff outreach booths at a number of events such as the ProGreen Expo in Denver.

From 2007-2008, Megan served as co-president of the Denver Chapter with Vickey Trammell. She organized the annual Denver Native Plant Garden Tours. She hosted Boulder chapter socials and picnics. In 2010 and 2011, Megan chaired both the Education and Outreach and Horticulture & Restoration Committee; in 2012, she cut back to one committee, chairing the Horticulture and Restoration Committee. Megan has been active in plant and seed sales in collaboration with the Front Range Wild Ones and has organized collaboration with Wildland Restoration Volunteers and their Purge the Spurge weed pulls.

John Vickery and Megan Bowes worked on a slideshow, "Weeds on the Wild Side" on how to recognize native plant communities for the Native Plant Committee of the Colorado Weed Management Association's annual meeting and a vegetation management presentation at the ProGreen Expo. They also presented a program for the Denver Chapter on "Ecological Services of Weeds: Weed Management with Wildlife in Mind."

These examples are not all-inclusive but they give you an idea of just how much Megan has done for CoNPS and its mission. In 2013, Megan received a CoNPS Certificate of Merit for her many contributions to CoNPS.

Megan will be missed on the Board but will continue to be active in the Boulder Chapter. Thank you, Megan, for all you have done for CoNPS!

Save the Date! 28-30 August 2015

Sedges of Colorado: Advanced Workshop and Field Trip. Dr. Anton (Tony) Reznicek.

See page 16 for details.

Jim Borland's "Garden Natives"

With this issue of *Aquilegia* we welcome the well-known horticulturist and radio personality, Jim Borland, as a columnist for *Aquilegia*. In each issue of *Aquilegia*, Jim's column will focus on one or more native plants that are good additions to Colorado gardens. See page 18.

Photo © Jim Borland

Jan Turner is New CoNPS Co-President

Because of a heavy workload with his paying job, Charlie Turner does not have as much time to devote to his role as CoNPS president. The Board approved Jan Turner as co-president of CoNPS to share the duties. Jan has been a member of CoNPS since 1997 and has served on the CoNPS Board of Directors since 2004. She chaired the Research Grants Committee, was co-president of CoNPS in 2008-9, and is the editor of *Aquilegia*.

RFP American Penstemon Society

The American Penstemon Society is seeking to fund small projects that focus on scientific or horticultural aspects of Penstemon, especially those that promote conservation or public appreciation. Grants of up to $1000 are available. The deadline for application is March 31, 2015, with funds distributed in May. Dorothy E. Tuthill. DTuthill@uwyo.edu

Time for Field Trip Ideas and Volunteers!

The following chapters need field trip ideas and leaders. Please volunteer (or suggest volunteers) to lead a trip for your chapter by contacting their presidents (listed in parentheses).

Plateau Chapter (Stephen Stern, stern.r.stephen@gmail)

Boulder Chapter (Erica Cooper, boulderconps@gmail.com)

Southeast Chapter (conpscturner@gmail.com)

Northern Chapter (ronda.koski@colostate.edu)

Seed Network Blossoms in Southern Rockies and High Plains

The demand for locally adapted native plant materials in our region has not been met for a variety of reasons. Lack of local production capacity, a reliable provenance system, and appropriate levels of coordination among agencies are just a few of the barriers being addressed by a blossoming network of committed seed lovers. On December 8, 2014, the annual meeting of a new ecoregional seed network, representing over 50 local seed companies, government agencies, non-profit organizations, and restoration companies decided to move forward with a unified voice for the development of native ecotypic seed. This broad group of users has agreed to pool needs for native seed, so that enough quantity can be demanded that farmers and seed companies can reliably and economically grow and sell the seed.

Photo courtesy John Giordanengo

A seminal program of Synergy Ecological Restoration, the seed network is working to raise funds and is seeking out assistance with website and database development, marketing, research, etc. Myriad interesting opportunities exist for passionate plant enthusiasts to help make this seed network grow. If you are interested in learning more about this network, or in growing seed, providing funding, building a database, volunteering on seed collection projects, and the like, please contact John Giordanengo at 970-420-7346 or john@aloterraservices.com. With some light lifting by many hands, we can get this budding network off the ground!

Request for CoNPS Research Grant Proposals: The John W. Marr and Myrna P. Steinkamp Funds

The Colorado Native Plant Society supports research projects in plant biology from the John W. Marr and Myrna P. Steinkamp funds. These separate funds honor the late Dr. John Marr, Professor at the University of Colorado and the first President of the CoNPS, and Myrna Steinkamp, a founding member of CoNPS who worked on behalf of the Society for many years in a variety of capacities. Both funds were established to support research on the biology and natural history of Colorado native plants by means of small grants. The Steinkamp Fund targets rare species and those of conservation concern. Both field and laboratory studies are eligible for funding.

Thanks to the generous contributions of many members and supporters, a total of nearly $4,000 is available, although individual awards will not exceed $1,000. Recipients of the awards must agree to summarize their studies for publication in *Aquilegia* and on the CoNPS website.

The Board of Directors is now soliciting proposals for a February 20, 2015, deadline. Information on guidelines and requirements for proposals may be obtained on our web site at http://www.conps.org/research_grants.html. If additional information is needed, contact Board member Catherine Kleier at ckleier@regis.edu.

Native Plant Master Program Announces 2015 Classes

The Native Plant Master® Program's Metro to Mountain Group has announced the 2015 schedule of offerings. Make this the year to learn more about Colorado's beautiful wildflowers, trees and shrubs. Take an exciting new class taught by CSU faculty and other experts or an award-winning Native Plant Master course where you learn about plants in their natural habitats in Jeffco Open Space and state parks. See http://npm.eventbrite.com for more information or to register. Register soon as offerings fill quickly.

Colorado Environmental Film Festival

CEFF 2015 will take place February 19, 20 and 21, 2015. at the Colorado Mountaineering Center in Golden This will be their ninth festival and they will return to the full festival format. To get more information or to volunteer, see http://www.ceff.net.

Ann Haymond Zwinger

Nature writer and artist Ann Haymond Zwinger passed away on August 30, 2014. Ann was well known for many books including *Land Above the Trees: A Guide to American Alpine Tundra* and *Aspen: Blazon of the High Country.*

President Wanted for Southeast Chapter

The president coordinates the planning of chapter programs, field trips, and other activities. Contact Charlie Turner if you are interested in volunteering. conpscturner@gmail.com

Ed Roland's Productive Presidency

Many thanks go to Ed Roland, outgoing president of the Southeast Chapter of CoNPS, for his work on behalf of CoNPS.

During Ed's presidency, the Southeast Chapter's conservation efforts included: working to influence the decision regarding Cristo's Over-the-River Exhibition; participation in the Rare Plant Stewardship training and generating the follow-up reports for Brian Kurzel with the Colorado Natural Areas Program; the road obliteration project with the WRV and the BLM at Garden Park; help with the native plant survey for the new Coral Bluffs Open Space in Colorado Springs; support and help with the USFS bioblitzes; and communications with the Bureau of Reclamation, Parks and Wildlife, and meeting with other local environmental groups to try to influence those agencies' decisions on the threat to native plant communities within Lake Pueblo State Park and the adjoining DOW area.

Ed's email to his chapter summarized the activities of the chapter well: "As I look back over the last eight years since we "re-founded" the chapter, I think we've accomplished some good things for Colorado's Native plants: We've offered many excellent field trips every year led by excellent trip leaders, assisted with a major re-vegetation project in Garden Park under Ann Zielinski's leadership, offered a Grass I.D. Workshop for the last 6 years under the direction of Rich Rhoades and Kimberly Diller, trained for and implemented a rare plant stewardship program in Lake Pueblo State Park, did an introductory Essential Botany class taught by Neal Osborn and Linda McMulkin in cooperation with CSU Extension - Pueblo for the last 4 years now, taught people how to propagate native plants for their landscapes (when they couldn't find them at the local nursery), and presented some great evening lectures and meetings in both the Springs and in Pueblo."

Job Openings and Other News on Website

Volunteer Webmaster, Sally Dunphy, is keeping the website up-to-date. See the News page of the CoNPS website for job announcements and other news items. The page contains links to organizations and to job sites. http://www.conps.org/News/index.shtml

Habitat Restoration Fundamentals and Monarch Conservation Webinar

Thursday, February 12, 2015 12:00pm - 1:00pm MST

This webinar from the National Conservation Training Center will examine the step-by-step procedures for designing, installing, and managing native plant communities specifically designed for monarch breeding. Registration info: http://tinyurl.com/mk6fs8j

Meet New Education & Outreach Committee Chair, Sara Copp

Photo courtesy Sara Copp

Our new Education & Outreach Chair, Sara Copp, received her Bachelor of Science in Agriculture with minors in Biology and Environmental Studies from Truman State University. She has a Master of Science in Environmental Science and Management from Portland State University, where she studied plant composition changes across the urban to rural gradient within a mixed conifer and deciduous forest. Sara worked as a contract research scientist for Portland State University She has practiced restoration ecology and natural resource management for over 5 years in a variety of land management roles where she has: planned and implemented restoration projects at both state and field office level; implemented an outdoor education program that taught local schools native plant collection, propagation, and restoration techniques; and developed monitoring protocol and planned the reintroduction of endangered *Fritillaria gentneri* on public land.

Wildland Restoration Volunteers Seeks 3 Seasonal Restoration Project Coordinators

The Restoration Projects Coordinators plan and run projects for WRV in amazing places across the state. They lead teams of skilled volunteers, provide logistical support, help train volunteers and much more! Three seasonal positions from March to November are now open, two are based out of Boulder and one out of WRV's Fort Collins office. For more info and to apply, see full job announcement or go to www.wlrv.org

2015 National Native Seed Conference April 13 -16, 2015 Santa Fe, New Mexico

Early registration is available through February 28 http://nativeseed.info/location/ for information.

High Altitude Restoration Science & Practice Conference

March 10-12, 2015, Colorado State University, Fort Collins

The High Altitude Revegetation Organization and the Central Rockies Chapter of the Society for Ecological Restoration will host a joint conference titled "High Altitude Restoration Science & Practice" on March 10-12, 2015. The aim of the conference is to connect practitioners, scientists, land managers, students, and policymakers to enhance our understanding of restoration theory and practice in diverse ecosystems using a variety of methods. http://chapter.ser.org/centralrockies/event/har-cerser-2015-joint-conference/

Online registration for attendees or vendors is open now through February 20.

We Want You

to join the Education and Outreach Committee.

The Education and Outreach Committee is looking for members who want to get more involved with the Colorado Native Plant Society!

We are looking for members who are interested in:

- developing joint events with agencies and nonprofits
- reaching out to college and graduate level students
- connecting with science teachers across Colorado
- working CoNPS booths at events across Colorado
- giving presentations throughout the year
- educating the public about native plants
- creating educational programs and fliers
- promoting CoNPS
- sharing ideas

If you are interested in getting more involved with the Education and Outreach Committee, please contact:

Sara Copp, E&O Committee Chair
Src715@gmail.com

Science Teachers Needed for Education and Outreach Committee

Do you agree that native plant and native plant habitat information is missing from the school curriculum? You can help CoNPS make it available.

Please contact Sara Copp at Src715@gmail.com

UNC Plant Seminars, Spring 2015

UNC Greeley's Department of Biology seminar series features a few botany-related talks this spring. Seminars are held Fridays at 3:35 in Ross Hall Room 1010 with a reception afterward.

Feb 6 - Carol Dawson, BLM State Botanist - "BLM Colorado Plant Conservation Program"

Feb 27 - Erin Tripp, CU Boulder - "Origins of Floral Diversity and Macroevolutionary Consequences"

Mar 6 - Ryan Fuller, UNC Masters Defense - "Geographic Patterns of Genetic Distribution of *Calochortus gunnisonii* In the Central and Southern Rocky Mountains".

More information including directions here: http://www.unco.edu/nhs/biology/index.htm

Forest Service to Have Regional Botanists in Western US Again - Finally!

By Steve Popovich, Field Studies Committee Chair

Much of the land administered by the US Forest Service (USFS) occurs within three western US Forest Service Regions: the Rocky Mountain Region (national forests and grasslands in CO, WY, NE, KS, and the southwest quadrant of SD, including the Black Hills), the Intermountain Region (national forests and grasslands in UT, NV, the south half of ID, part of northeast CA, the Bridger-Teton forest in WY, and the portion of the Manti-LaSal forest that lies in CO), and the Southwest Region (national forests and grasslands in AZ and NM). Although many of these forests and grasslands employee full-time Botanists, the Regional Botanist position for each of these regions has been vacant for one year (Intermountain Region), two years (Rocky Mountain Region), or even numerous years (SW Region).

The Regional Botanist is responsible for quality assurance and consistency in implementation of the Forest Service's botany program across a region, including cross-walking botany with other Forest Service missions and working with cooperators and stakeholders. Recently, I was the Acting Regional Botanist for the Rocky Mtn Region (Jan 2013 – April 2014) as well as for the Intermtn Region (April –September 2014, when I lived temporarily in Ogden, UT, to work out of that Regional Office). During that time, one of my most important assignments was to highlight the importance of maintaining a regional botany program and to stress the need to fill these vacancies as soon as possible.

I am pleased to say that all three of these positions will finally be filled again, after years of keen anticipation by USFS Field Botanists, universities, cooperators, native plant societies, and the general botanical community! In fact, the Regional Botanist position for the SW Region was filled just last September. The new Regional Botanist, headquartered in their Regional Office in Albuquerque, is Dr. Katheryn Kennedy, who comes to the USFS from the Center for Plant Conservation. She carries much experience in rare plant conservation and partnerships, and will be a valuable asset in renewing the vigor of a regional botany program in AZ and NM. The job announcements for the remaining two regions closed in late 2014. If the timeline for filling these positions stays on track, we can expect that the Rocky Mtn and Intermtn Regions will have new Regional Botanists by spring or early summer, 2015, hopefully in time to capture the 2015 summer field season! It is wonderful to see the USFS filling these positions, and this reflects the recognition by the USFS of the importance of maintaining strong regional botany programs in the Western US.

Proactive Rare Plant Surveys Yield Noteworthy Collections in Colorado

By Steve Popovich, Field Studies Committee Chair

Several years ago, attendees of the annual Colorado Rare Plant Symposium identified survey needs for some of Colorado's rarest and over-looked plants. The purpose of the surveys was to gain information on their abundance and distribution in Colorado. In response to recognizing these needs, the Arapaho-Roosevelt National Forests, US Bureau of Land Management, and CoNPS sponsored several individuals to perform proactive surveys to find more occurrences of the rare plants. "Proactive" surveys simply means the surveys were performed solely to gain knowledge about the target species, rather than being driven in response to a proposed project on public lands that could potentially conflict with plant conservation.

First, Brian Elliott, of Elliott Ecological Consulting (and former Botanist for the San Isabel National Forest in Salida), set out in 2013 to re-locate two vaguely-described historic sites for the rare subalpine/alpine grass Hall's fescue (*Festuca hallii*). There were five historic occurrences of this S1-ranked and Forest Service Sensitive Species in Colorado, two of which reside in northern Colorado on the Roosevelt National Forest. In 2003, Brian was able to relocate a historic site on the Spanish Peaks that was last observed in 1978. He estimated several thousand plants. In 2013, even though locality data were vague, his survey efforts resulted in successfully relocating both historic populations on the Roosevelt National Forest, one on Cameron Peak near Cameron Pass, and one further north in Shipman Park in the Rawah Wilderness of the Medicine Bow Mountains. These populations were last observed in 1956 and 1954, respectively – 60 years ago! The Cameron Peak site was expanded with more subpopulations, and 2,140 ramets (different individuals) were counted, while 316 ramets were estimated at Shipman Park. He even searched — to no avail — for Dr. William Weber's Marsh pick accidently left at the Cameron Peak site in 1956! Thanks to Mr. Elliott, we now know that three of the five historic sites in Colorado remain extant and appear stable. Location information is so vague at the remaining two historic sites (Custer County and South Park) that re-locating them may prove to be unrealistic.

Second, in 2013 and 2014, Brian also searched for rare (S1-ranked) lichens in the sagebrush-steppe of Middle Park and north of Kremmling. Lichens receive disproportionately less survey efforts in Colorado relative to other rare species, and we know much less about their ecology and habitat requirements. In 2011, Dr. Roger Rosentreter (lichenologist formerly with the BLM in Idaho) and I were able to relocate the historic site and find one new site of the vagrant (i.e., rolls along the ground unattached to the soil) globally-rare Idaho *Xanthoparmelia* lichen (*Xanthoparmelia idahoensis*). There were only four known populations of this *Xanthoparmelia* in the world, one group of adjacent sites in Colorado, one site in Idaho, and two sites in Eurasia. We also found populations of the rare lichen *Circinaria rogeri*, a new species named after Roger. Additionally, I found a State record of the vagrant "form" of the reticulate silverskin lichen (*Dermatocarpon reticulatum*). With the help of Mike Kirkpatrick (Botanist on the Shoshone National Forest) and Scott Smith, Brian and his cadre's efforts were able to document in Colorado 15 new *Xanthoparmelia* sites, 18 new *Circinaria* sites, and four new *Dermatocarpon* sites! Although still quite rare, results indicate that these species are more common, at least in Colorado, than previously believed. Results also

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Report on the CoNPS Moss Field Trip Boulder Chapter, October 24, 2014

Lynn Riedel and Megan Bowes

In late October, Dr. William Weber (Bill) and Ron Wittmann led a moss identification field trip in the Boulder foothills that turned out to be quite an adventure! This "mossing" trip was the last hike of the year sponsored by the Boulder Chapter. Bill Weber gave a rich introduction with tales of his youth and beginnings in science, as well as interesting bryophyte facts. He pointed out that mosses are older than ferns and may not have changed much in millions of years – and that Colorado has moss species in common with Turkey, Syria, and other places far from North America.

The plan was to hike up one of the trails in the Shanahan area which has a rocky and steep initial accent, searching for mosses along the way. To our amazement and admiration, Dr. Weber decided to join the hike. His comments to Jan Turner later sum up his hiking experience: "…I walked about four miles up to the Mesa Trail with two beautiful gals one on each arm to help me over the boulders and water bars! I don't think I'll do that again, but it was fun." Anyone in their mid-90's would be pleased to tell that story!

Bill Weber Photo by Camille Thorson

Ron searched for mosses with the group, and both he and Bill taught participants useful identification characters. An array of moss species were observed with the best diversity encountered in a moist canyon. The trip highlight for all was seeing *Rhytidiadelphus triquetrus*, a Colorado record first discovered by Ron Wittmann and Dr. Weber in 2001. They were delighted to show this botanical treasure to the group. A list of some of the genera and species observed on this unforgettable trip follows.

Amblystegium serpens (FNA considers *A. juratzkanum* to be synonymous)

Leskeella nervosa

Brachytheciastrum (was *Brachythecium) collinum*

Tortula mucronifolia

Ceratodon purpureus

Bryum argenteum (small and often growing in sidewalks)

Grimmia sp.

Hypnum revolutum (forms extensive mats)

Orthotrichum sp.

Rhytidiadelphus triquetrus (one Colorado record)

Lynn Riedel has spent her career in natural areas management in Colorado – initially with the National Park Service, and since the mid-1990's she has worked as a plant ecologist with the city of Boulder Open Space and Mountain Parks Department.

Megan Bowes has served as chair of the Horticulture & Restoration Committee and the Education and Outreach Committee as well as co-president of the Denver Chapter of CoNPS. Megan is a plant ecologist technician with city of Boulder OSMP.

Ron Wittmann discusses a rare moss
Photo by Linda Boley

Photos by Linda Boley

Seeding the Future: Honoring the Life and Work of William A. Weber, "The Naturalist": A Summary of the Celebration

By Barb Losoff and Rebecca Kuglitsch

Photo by Loraine Yeatts

Undaunted by record-breaking cold, over one-hundred and thirty hardy souls weathered the elements on November 12, 2014 to celebrate the extraordinary life and work of Dr. William A. Weber, preeminent botanist and natural historian. The event, hosted by University of Colorado Boulder Libraries, along with the Friends of the Libraries, honored Dr. Weber as a new entrant into the pantheon of the University Libraries CU Legends. The occasion took place in the Center for British and Irish Studies, an elegant room on the 5th floor of Norlin Library that overlooks the historic quadrangle of the CU Boulder campus. The atmosphere was festive and hummed with conversation as old friends gathered and greeted one another, and new friends met.

Jim Williams, the Dean of the Libraries, was the first to take the podium. Dean Williams provided the background for the University Libraries CU Legends Series which highlights those teachers and scholars whose contributions have had lasting impact on their discipline, the campus, and the community. Speaking as friend and colleague, Dean Williams expressed how Dr. Weber's work embodied all the elements of the CU Legends Series as he elevated the University's academic reputation through his well-regarded and prolific publications and by building a world-class herbarium. The Dean also acknowledged Dr. Weber's contribution to the community through the ever-popular *Colorado Flora* guidebook series, which broadened his intellectual influence beyond the academy.

The second speaker, Dr. Pat Kociolek, Director of the University of Colorado Museum of Natural History, situated Dr. Weber's intellectual career in the larger context of twentieth and twenty-first century botany. He expressed his admiration of Dr. Weber's contributions as both a famed botanist and as a naturalist, speaking of how Dr. Weber differs from most researchers in that his expertise is not limited to a single, particular plant species. Instead his knowledge encompasses the totality of the ecosystem including the vascular plants, fungi, mosses, and lichen as well as insects and birds, situating the organism in question in a rich tapestry of life. It is this passion for the natural world that inspired Ruth and Ken Wright to establish the William A. Weber Endowed Fund for Children's Education in Natural Sciences. This fund, administered by the Museum, will "support natural science education programs for children that foster exploration, appreciation and love of the natural environment in all its diversity."

The final speaker honoring Dr. Weber was Dr. Erin Tripp, Assistant Professor, Curator of Botany at the University of Colorado Museum of Natural History Herbarium, who delivered a stirring speech on what it means to be a legend—and how Dr. Weber qualified. To earn the status of a legend, a person must be a visionary. In establishing the herbarium, Dr. Weber had "the foresight to build a collection not just for current science but a collection that will facilitate science of the future." He knew the importance of the voucher specimen and the essential role of herbaria in furthering studies on plant evolution and diversity. Dr. Tripp testified to the new ways these specimens and their information can be used: for studies of phenology and climate change, for genetic population studies, for genetic taxonomic investigation, and more. In addition to understanding the value of herbaria for the progress of science, Dr. Weber understood the benefits of herbaria to society at large. From agriculture to climate change, the specimens in the University of Colorado Museum of Natural History Herbarium are a unique collection for helping to decipher the past, to understand the present, and to apply what is learned to the future.

Following the panel of speakers contextualizing Dr. Weber's legacy, the audience was treated to the premier of *The Naturalist,* a short film documenting Dr. Weber's remarkable life, from his youth in New York's naturalist glory days, to his early years at CU, to his international research and travels. The film, set to Glenn Miller's Moonlight Serenade, and narrated by Dean Williams, was the creation of Louis Zeller, a CU film studies student.

At last, the culminating moment arrived when the man of the hour, Dr. Weber, took to the podium. He brought the house down with a brief review of his theatrical career and finally his recitation of Lewis Carroll's satirical poem, "You are Old Father William," establishing his thespian credentials as well as his scientific credentials. Unsurprisingly, the evening ended with a standing ovation for Dr. William A. Weber whose accomplishments are larger than life. We all felt lucky to be in the presence of a legend and a true polymath.

If you'd like to learn more about Dr. Weber, please visit Norlin Library to see the poster installation on the 2nd floor, The Naturalist: Honoring the Life and Work of William A. Weber which will remain on display until spring 2016. This exhibit, curated by Andrew Violet from the Libraries Programming and Communications Office, was supported by a generous donation from the Friends of the Libraries. Additionally, the video recording of the evening and the film *The Naturalist* will be available online in early 2015.

Barb Losoff is the Life Sciences Librarian at the University of Colorado Boulder Libraries, Barbara.losoff@colorado.edu and Rebecca Kuglitsch is the Interdisciplinary Science Librarian at the University of Colorado Boulder Libraries, Rebecca.kuglitsch@colorado.edu.

Workshops

For complete descriptions and to register, see our website http://www.conps.org/Activities/workshops.shtml or contact Ronda Koski at conpsworkshops@gmail.com

Grass Identification Workshop

One-day workshop, 9 a.m. - 3 p.m.

Cost: $30 (non-member price $45)

Saturday, April 25, 2015 - Douglas County Extension, 410 Fairgrounds Road, Castle Rock, CO 80104; 9 a.m.-3 p.m.

Workshop will be in the CSU Extension Building - Garden Level Conference Room

Presenter: Rich Rhoades

This workshop is designed to provide a basic knowledge of grass morphology and terminology as it pertains to identifying grasses. Workshop attendees will use "Illustrated Keys to the Grasses of Colorado" by Janet Wingate to learn how to use keys to identify common grass species. Rich will provide a brief presentation about grasses, and the remainder of the workshop will be devoted to keying out a variety of species. At the end of the workshop attendees will have the ability to key out many common grass species.

How to Know the Sunflower Family: Learning the Terminology, the Major Groups, and the Ecology of this Major World-Wide Family

One-day workshop on two separate dates, 9 a.m. - 3 p.m. Indicate desired date when registering!

Cost: $30 (non-member price $45)

Dates: Saturday, February 14, 2015

OR Sunday, February 15, 2015

Location: Rocky Mountain Arsenal Wildlife Refuge, 6550 Gateway Road, Commerce City, CO 80022

Workshop will be in a classroom in the Contact Station. Look for signs that will direct you to the classroom.

Presenters: David Buckner and Carla DeMasters

Photo by Bob Powell

This workshop will cover the basics needed to identify members of the Sunflower family (Asteraceae) including structures and their names (often unique to the Asteraceae). Streamlined visual flow charts to the tribes of the family will be provided. Evolution and ecology of the Asteraceae will also be covered. David will have specimens of western U.S. species available for examination and materials will also be available for dissection to allow participants to become familiar with the appearance of previously unfamiliar structures —phyllaries, receptacle, pappus, etc.

How to Collect Native Plants

One-day workshop on two separate dates and locations; 9:00 am - 4:00 pm Indicate desired date when registering!

Cost: $30 (non-member price $45)

Choose from one of the following workshop sessions: See CoNPS website for directions.

March 7, 2015 in Fort Collins, Colorado

US Forest Service - Canyon Lakes Ranger District

Arapaho-Roosevelt National Forests and Pawnee National Grassland

2150 Centre Avenue, Building E, Fort Collins, Colorado 80526

Continental Divide Conference Room

OR

March 14, 2015 in Golden, Colorado

Jefferson County Extension Office

15200 W. 6th Avenue, Unit C

Golden, Colorado 80401

Presenters: Steve Popovich and Melissa Islam

This workshop is back by popular demand! Collecting our native flora is necessary for scientific study. But how can it be done without harming fragile populations? When and where is it legal to collect? This workshop will cover how to acquire the proper permits, determine land ownership and how to avoid collecting sensitive species. We'll also walk you through the process of collecting scientific specimens, including how to take field notes. This workshop is perfect for those conducting workshops, field trips or field studies, and satisfies an upcoming requirement for those who teach or lead plant collecting while representing the Society to have attended a plant collecting ethics class or on-line Society training. Select the date or location that works best for you!

Steve Popovich is Forest Botanist/Rare Plant & Invasive Species Program Manager for the Arapaho & Roosevelt National Forests and Pawnee National Grassland. He has 25 years in natural resource management of public lands, primarily focusing on the conservation and management of rare plants and plant communities in the West.

Melissa Islam, PhD, is the Associate Director of Research & Head Curator at the Kathryn Kalmbach Herbarium at Denver Botanic Gardens. Her research explores questions about the diversity and ancestry of plants in the Southern Rocky Mountain region and similar regions around the world.

(Continued on next page)

Save the Date! 28-30 August 2015
Sedges of Colorado:
Advanced Workshop and Field Trip @ Rocky Mountain Biological Lab, Gothic, CO
Dr. Anton (Tony) Reznicek

Eminent botanist Tony Reznicek (University of Michigan) will be returning to Colorado to provide a workshop on the sedges of Colorado, focused on the western slope. Denver Botanic Garden, Colorado Native Plant Society, and University of Colorado Denver are collaborating to offer a "sedgevent" that will combine a workshop at the picturesque Rocky Mountain Biological Laboratory (RMBL) in Gothic with two days of field trips. The workshop will be held on Friday with an hour of lecture and then focus the rest of the day on identifying fresh specimens.

Saturday and Sunday, we will venture out into the field focusing on areas around Crested Butte. The workshop is targeted at advanced beginners to those with intermediate skills. Fees for this three-day workshop will be higher than our normal workshop fees. Look for additional information in March on the CoNPS website regarding registration and fees. If your organization is willing to help sponsor this workshop to help defray the cost, please contact Leo Bruederle (Leo.Bruederle@ucdenver.edu).

Chapter Events

BOULDER CHAPTER

Floristic Inventory of White Rocks Open Space
Dina Clark
Thurs., Feb 12, 6:30 p.m.

Dina Clark will present the highlights of her comprehensive inventory of the vascular plants of White Rocks in 2014. The dramatic sandstone cliffs, rising above Boulder Creek at White Rocks Open Space, support a flora of great botanical interest. Plants little known from North America and those more common to the woodlands of Eastern North America are found growing in rock crevices, in eroded alcoves, or under sheltered overhangs of the White Rocks escarpment. These unusual species mix with those more common to the High Plains and Front Range Piedmont in soil deposits interspersed among the rock pavement and on the surrounding slopes. Dina will relate the findings from her baseline study to past research at the site, and comment on current and future management needs.

Dina Clark is a collections manager at the University of Colorado Herbarium. She has conducted botanical inventories across Colorado, specializing in the flora of the High Plains.

Roadside Botany and What Grows Where!
Alan Carpenter
Thurs., March 12, 6:30 p.m

BoCo Post-flood Riparian Study
Laura Backus and Susan Sherrod
Thurs. April 9, 6:30 p.m.

Winter chapter meetings will be held at the West Boulder Senior Center at 6:30 p.m. every 2nd Thursday, November through April. The building is downtown off Arapahoe and 9th, just west of the Library (909 Arapahoe Ave., Boulder, CO 80303).

Photo by Linda Smith

METRO DENVER CHAPTER

The following programs will take place at 7 p.m. in the Perrin Room, Englewood Public Library, 1000 Englewood Parkway.

Extreme Rich Fens
Carol English
February 24, 2015, 7 pm

Extreme rich fens are unique and amazing habitats that are rare on this planet. The plants, plant communities and animals in these ecosystems have adapted beautifully to harsh and extreme conditions. Colorado is home to some of these rare ecosystems due to a unique set of conditions that occur in Park County, Colorado. You will learn why these extreme rich fens occur and how they differ from other wetlands and fens. You will see many photos of the plants and plant communities that live in these ecosystems.

Carol English grew up loving the outdoors and spent her high school summers backpacking in the Sierra Nevadas. She received a BS degree in Earth Science from University of California Santa Cruz, and promptly moved to Steamboat Springs, CO learning to telemark ski, rock climb and kayak. She then taught environmental science for 10 years at both Yosemite Institute in California and at Lookout Mountain Nature Center in Colorado. After that she received a master's degree in Biology and studied the pollination biology of the lovely, rare and endemic *Penstemon degeneri* that occurs in and around Cañon City, Colorado. Carol now works as a Conservation Biologist for the Colorado State Land Board. She travels the state working on various biological projects including extreme rich fens in South Park, and greater sage grouse work in Western Colorado.

US 36 *Spiranthes* Mitigation
Samantha Clark
March 24, 2015, Tuesday, 7 pm

Section 7 of the Endangered Species Act mitigation for the construction of US 36 Phase 2 was completed in the spring of 2014. Mitigation goals included the creation of habitat for the Preble's meadow jumping mouse and Ute ladies'-tresses orchid (ULTO) on a 24 acre parcel located in Boulder County, Colorado. This presentation focuses on the creation of ULTO habitat including grading plan/specification development and agency/ contractor coordination that occurred to relocate ULTO plants and sod to the mitigation site.

Samantha Clark is a biologist with more than 20 years of experience in wetland, riparian and upland mitigation design and construction/mitigation monitoring. Ms. Clark has worked very closely on the US 36 Phase 2 mitigation with CDOT staff including Patrick Hickey, Wetland and Wildlife Biologist with CDOT Region 4 and Tim Buntrock, CDOT Environmental Manager for the US 36 Express Lane/BRT Project

Phacelia
Luke Tembrock
April 28, 2015, Tuesday, 7 pm

Phacelia is a genera that has diversified in western North America including Colorado. Luke will discuss the implications of this radiation in terms of the most recent taxonomic revisions based on modern phylogenetic techniques, biogeography, and conservation for this group. Historical insights such as past taxonomic revisions and plant explorations will be discussed. Participants will be guided through the most current dichotomous key written for the genera by Jennifer Ackerfield.

Luke Tembrock is a Ph.D. Candidate in the Department of Biology at Colorado State University. In addition to his interests in species of *Phacelia* and *Aliciella*, Luke is interested in the evolution of plants that are cultivated by humans, and in particular the genetic changes that take place in these plants as humans move them from their wild centers of origin. Luke has studied this evolutionary process in the stimulant drug plant *Catha edulis* (Qat), for which there is a well-documented written history, and thus a set of testable hypothesis. In his research, Luke employs methods from the fields of phylogeography and population genetics to test said hypotheses. Luke is also interested in the evolution of alkaloids (especially those that affect the human central nervous system) and related molecules in plants. He employs techniques from analytical chemistry, phylogenetics, and ethnobotany to study these alkaloids.

NORTHERN CHAPTER

Partnering with the ESN (Ecoregional Seed Network)
Speaker: John Giordanengo
Thursday, March 5, 2015, 7 p.m.
The Gardens on Spring Creek, 2145 Centre Avenue, Fort Collins

TBA, Thursday, April 2, 2015, 7 p.m. The Gardens on Spring Creek, 2145 Centre Avenue in Fort Collins

Stay tuned for the complete list of meeting topics and speakers!

SOUTHEAST CHAPTER

The Southeast Chapter needs a new president. Are you interested?

Please contact Charlie Turner at CoNPSCTurner@gmail.com.

San Juan/4 Corners Native Plant Society

From Desert Dust to Mountain Snow to Desert Plants
Tuesday, February 11 6:30 p.m., Lyceum Room,
Center for Southwest Studies, Fort Lewis College, Durango
Presenter: Michael Remke

Disturbances to desert ecosystems are resulting in increased wind and water erosion of soils across the Colorado Plateau and Great Basin. Spring wind events transport desert dust to the mountainous regions of Colorado and Utah where the dust is deposited on snowpack. The dark layer of dust accelerates snowmelt, extending the growing season for many plants. The dust on snow also impacts Colorado River Basin runoff -- and the ski industry. Desert plants, including the microfauna of biological soil crusts, can provide a reasonable mechanism for restoring disturbed desert soils and preventing dust storms. Land managers can increase restoration success by focusing on soil organism community restoration to better grow desert plants. Local soil organism communities could be collected to give plants a competitive edge in conservation and restoration efforts.

Michael is a Fort Lewis College alumni. He is currently pursuing his Ph.D. at Northern Arizona University where he is studying plant-soil organism interactions. Michael's research aims to better understand limits to plant migration and adaptation to climate change and practical ways that land managers could address these limits.

Climbing with the Wildflowers in Ecuador
Tuesday, March 11 6:30 p.m., Fort Lewis College, Durango
Presenter: John Bregar

While primarily in Ecuador to bird watch and climb volcanoes, John also managed to capture photographs of lots of flora. John has identified some of the flora in his photos, but some flora remains a mystery that he will share with us. All images are of showy and exotic plants. John will also include photos of volcanoes, birds, and the Ecuadorian countryside.

http://www.swcoloradowildflowers.com/San%20Juan%20Four%20Corners%20Native%20Plant%20Society.htm

Garden Natives
by Jim Borland

With this issue of *Aquilegia* we welcome the well-known horticulturist and radio personality, Jim Borland, as a columnist for *Aquilegia*. Jim is the co-host of "Ask the Garden Pros with Jim and Keith" on KEZW Saturday mornings from 7-9 a.m. In each issue of *Aquilegia*, Jim's new column will focus on one or more native plant(s) that are good additions to Colorado gardens and may also include news items and opinion pieces. Jim's beautiful photograph on the cover of this issue of *Aquilegia* features the gorgeous native, swamp milkweed, *Asclepias incarnata*. It is also the November 2015 photo in the *2015 Colorado Native Plant Society Calendar*, that can be purchased from the CoNPS Bookstore for $12 and is printed on heavy stock.

Jim's knowledge of gardening with native plants and the natural history of native plants is encyclopedic and much of it is from hands on experience and observations. He knows a lot that isn't in the books and is a skilled writer who brings knowledge and humor to his work. Jim got his start gardening when, as a child, his mother told him to weed the rock garden. Within a few minutes he found an arrowhead and he has been looking for more ever since. He calculates that he has killed more than 8,567 plants while coaxing a couple to live long enough to brag on them. A lazy gardener, he has stopped watering his front yard yet is able to grow more than 125 species of woody plants and innumerable perennial, biennial and annual plants. While the co-host of his radio show has a garden worth complimenting, Jim is often asked if he needs help cleaning his up. Though he installs a hammock in the backyard each summer, he has yet to use it more than twice a year. Helping him garden are a coterie of foxes, raccoons, skunks, cats, coyotes, squirrels, mice, dogs and a wife who won't let him into her side of the garden until holes have to be dug, grass cut or garden debris hauled off to the compost pile.

Jim is a former president of the Colorado Native Plant Society. An article on his yard can be found in the Winter 2013 issue of *Aquilegia*. Jim and Dorothy Borland's beautiful native plant yard was featured in the CoNPS Native Plant Yard Tours.

Asclepias incarnata

Swamp Milkweed

Don't be dismayed by the 'swamp' portion of this plant's common name. My wife, Dorothy, has been growing several of them in a decidedly non-swamp part of her perennial garden where they have performed handsomely for years with virtually no attention what-so-ever. In fact, they are growing so well that they have to be staked lest their 5-6 foot height fall over from exuberance onto her other perennials. We discovered, after several years of growth, that neither of us had planted them. They volunteered from some unknown source (blame birds since they are universally blamed for anything occurring out of place).

USDA-NRCS PLANTS Database / USDA NRCS. Wetland flora: Field office illustrated guide to plant species. USDA Natural Resources Conservation Service.

Aside from our garden, Swamp milkweed can be found growing in 45 of the 50 states (not in WA, CA, OR, AZ & MS – no explanation for the latter). In nature it almost always occupies moist or wet ground in swamps, marshes, sloughs, edges of ponds, lakes and rivers and in wet meadows. Its pink, fragrant flowers are magnets for a multiple of bee species (and assassin bugs), hummingbirds and butterflies, including the Monarch. The larva (caterpillar) of the Monarch butterfly feeds on it but deer are repulsed, according to some sources. Flowers, as you can see, are shades of pink but white and red flowered cultivars are readily available for the gardener as well.

Though Swamp milkweed can be grown from cuttings of roots and young stems, the easiest method (aside from buying one at your local garden center) is from seed. Seed needs light to germinate so do not cover deeply and near 100% germination should be completed within one to three weeks at 65 to 70 ° F. Some sources indicate that the seed needs to be first subjected to a 30 day cool-moist period before subjecting them to warmer temperatures. This can be accomplished by sowing them to a pot in late fall and leaving the pot outdoors all winter. Remember to keep the pot watered throughout winter since the seeds cannot perceive this cold treatment unless they are kept moist.

The perennial Swamp milkweed is typically found up to 6,000 feet here in Colorado where it prefers silty clay to silt loam soils, though most garden soils should prove adequate. It is a shallow rooted, slow spreading plant that blooms (June) July through August (September).

Flower Color Shift in *Aquilegia caerulea*

A recent article in *Aquilegia* (38:4) by J. Ng and R.G. Laport (What's the Buzz about Flower Color Diversity?) summoned up two experiences I had in the early '80s regarding flower color shifts in *Aquilegia caerulea*. During that time I was working at the first native plant nursery in Palisade, Colorado owned and operated by Charles Weddle, plant breeder extraordinaire. Also at that nursery, conducting field and greenhouse trials was Charles' friend, Dr. Jesse Fults, also a plant breeder. Jesse Fults is probably best known for his introduction of alkalai grass (Fults Alkalai) to the commercial trade.

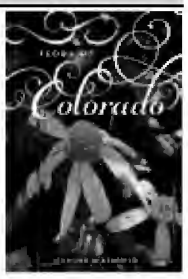
Jesse's current project was the development of a superior strain of seed grown *Aquilegia caerulea*. The goal was to select for pure white petals, deep blue sepals complete with white tips and straight, but spreading, spurs. To that end Jesse collected seed from high altitude, wild populations across the species' range, north to south.

(Continued on page 25)

Conservation Corner

Writing a Flora: An Interview with Jennifer Ackerfield

by Mo Ewing
CoNPS Conservation Chair & Treasurer



In March 2015 Jennifer Ackerfield will publish the first complete *Flora of Colorado* since Harold Harrington's 1964 *Manual of Plants of Colorado*. Her 800+ page book will contain 3,322 taxa (species, subspecies and varieties), 912 color photos, most of which she took herself, and descriptions and distribution maps of every species. Jennifer is 39 years old.

What kind of person would write the first complete flora in 50 years? And what is it like to write one?

Jennifer was born in rural Kansas in 1975. When she was 5 years old, she says, she was already in love with birds and trees. She used to drive her mother crazy bringing home all kinds of things from the fields around her house. "What are all those weeds doing all over the front porch?" her mother complained. In high school she had an herb garden, a medicinal plant garden and another garden for vegetables. She decided to go to Colorado State University because it was the closest place that offered botany and horticulture which became her double-major.

She loved collecting plants, organizing them and trying to figure out how they related to one another, but she didn't quite know how to combine all those interests into a career. Then, in her last undergraduate semester at CSU, she took a course in plant systematics with Jun Wen and said, "this is where I can do all of the things I want to do." Systematics would allow her to both collect, organize and piece together the relationships of plants.

She intended to get a PhD, but, "life got in the way," and she received a Masters degree in 2000. At that time, the CSU herbarium was run by a handful of volunteers but CSU decided that it was time to create a part-time, 15 hour position for a collection manager. Jennifer applied for the position and was hired. Over the next 14 years she would create a student internship program, get grants for the herbarium and students, digitize the whole collection, create a complete database of specimens and collect over 7,000 plants.

Just after she started in her new position, Jennifer thought she would start a reference collection. Her reference collection would pull together into one cabinet, one example of each species in the herbarium so that people could easily pull out the plants they wanted to study. But Jennifer found an interesting thing. There were a lot of species that were misidentified. Plants that were the same species were split into separate species, and others that were different were lumped together. Additionally, in spite of the fact that the taxonomy of many plants had been changed over time, the collection had never been updated.

So she decided to create a spreadsheet which described each of the characteristics of each plant. Species names on the Y-axis and plant parts (stems, flowers, petals, leaves) on the X-axis. In order to make sure that she got plants correctly identified and described, she had to use five or six different floras, some from Colorado and some from other states. In this process, she discovered another interesting thing. Many of the mistakes in identification in her herbarium seemed to occur because the keys that botanists used were incorrect or unclear.

At the same time, she started teaching botany students at CSU and began to put together keys for problem plant groups. The first key that her students needed was a good key to the asters, so that is where she started. (Asters are so problematic partly because there are so many of them; one of the things Jennifer found after she had completed her flora was that the aster family comprises nearly 17% of the entire Colorado flora.)

Jennifer loved writing the keys. "I love sorting and organizing things; my closet is color coordinated. I always keep puzzles on the table for my children. When I get bored, I reorganize all of the shelves in my kitchen."

One day Bill Jennings came into the herbarium to bring in some specimens. He happened to notice some of the keys and spreadsheets on Jennifer's desk. "These are terrific!" he said. "You should compile them into a flora!" And she thought, "Really? Well....maybe that would be useful." Bill Jennings suggested starting with the smaller plant families, and working towards the larger ones from there. She would not have completed this project without Bill's support and assistance. Jennifer first went to

the *Provisional Checklist for Vascular Plants for the Southern Rocky Mountains Interactive Flora*, written by Neil Snow and Jeffrey Brasher in March 2000, and compiled a list of all known vascular plant taxa in the state. After writing keys for a couple of the smaller families, she changed course and started writing keys for the plants that her students were collecting (such as the Asteraceae). She thought the project would take about five years to complete. That was 12 years ago.

Circium clavatum
Photo by Mo Ewing

In order to figure out how to key the plants, she did what she calls, "arm's length botany." She would hold the plants at arm's length and ask the question, "What are the most obvious differences between these plants?" Luckily she had collections of all the species in her herbarium. That was partly true because the Colorado Natural Heritage Program used it as the repository for all the rare plants they collect and track, and because of the extensive collections made by Harold Harrington. Most of the keying work was done on herbarium specimens. She would look at the differences between each plant and then split them in piles on the floor according to their different morphologies, splitting and splitting until her piles were down to individual species.

She found that some genera, like *Ribes*, had morphological characteristics that were rather easily quantifiable. In those cases she could use just the few species in the herbarium. But other genera had very plastic morphology, like *Epilobium* or *Cirsium*, which varied so much that she had to look at a lot of specimens to make sure that the keys worked properly. For these she often went up to the Rocky Mountain Herbarium in Wyoming to look at additional specimens, where she received mentoring and assistance from Ron Hartman.

She spent a summer creating a key to the plant families of Colorado. "I hated having to cut open the ovaries of plants to figure out what family it belonged to," she said. She also felt that students struggled greatly with this as well, so she avoided using this character in the family key. The key to the families really begins with the number of perianth parts, is the perianth absent, or are the flowers in parts of 3s or in parts of 4s or 5s? This also avoided the issue of determining whether the plant was a monocot or dicot.

Her students were a great help to her because they used her new keys all the time and gave her constant feedback. When she saw them becoming confused or making identification errors, she would look at the key and say, "What is it about this that is confusing them?"

There were some genera that were really problematical. For these, Jennifer had to go all the way back to the type specimen (the specimen that was used to first describe the species). Often the original descriptions of the type specimen were not very complete, so she had to have the specimen sent to her so she could study it. (Later, as the internet developed, high-resolution digital images became available so that this was no longer necessary.) From the original description, she would work forward in time through the various floras to see where the taxonomic errors occurred.

An example of this issue occurred in the genus *Abronia*. There were several collections of *Abronia* in the CSU herbarium that were identified as *Abronia argillosa*. Bill Jennings said to her one day, "This *Abronia argillosa* feels like *Abronia glabrifolia* to me, a species known from the type specimen but rather forgotten in the flora of Colorado." So she had the type specimen from 1906 loaned to her and it turned out that all of the plants were, in fact, the same species, *Abronia glabrifolia*.

Jennifer chugged along on her project until 2005 and then, as she said, "life happened." She had twins and because she wanted to spend more time home and experience motherhood, she did no work on her flora for about a year. Then she came back to work "part-time," that is, she was paid part-time, but in fact worked on her flora for about 40 hours per week.

Abronia elliptica Photo by Mo Ewing

Then in 2011, her life totally caved in. She was diagnosed with cancer and the same week she separated from her husband. She went through six months of chemotherapy, 36 rounds of radiation, and had 8 surgeries in a 2 year period. When she stopped the chemotherapy and radiation, things got worse. She developed "chemo-brain," an affliction resulting from chemotherapy and radiation that alters the functioning of the brain. She felt like she was walking around in a constant, thick fog. Something as simple as going to the grocery store overwhelmed her. She couldn't do any more than one thing at a time. She completely lost her short-term memory. Botanical descriptions wouldn't stay in her mind. If she tried to compare one description with another she would forget the first one before she finished reading the second.

In addition she was crippled by peripheral neuropathy, a chemo-induced destruction of the nerves in her feet. She couldn't walk from her car to her office without experiencing severe pain. The flora was put aside while she struggled to regain her health.

Ribes aureum Photo by Mo Ewing

And then, all at once, she said, the fog lifted, her neuropathy subsided and after a year of hell, she was able to start working on her flora again.

As she approached its completion, working on the keys to the grasses, she decided that she should write complete descriptions of all 3,322 species in her flora. By that time she had all the information she needed in her Excel spreadsheets, but it still took her a year to complete. Then she thought, "I really ought to have distribution maps of the species." So she added those, and came to the end of the project.

The *Flora* incorporates many of the taxonomic changes that have been recommended by genetic research. Although this drives people crazy, Jennifer thought that the changes should be incorporated in her flora. In order to do this responsibly, she follows the nomenclature in *The Jepson Manual: Vascular Plants of California* by Bruce G. Baldwin, et. al. She chose this manual because it was very conservative in accepting newly described genetic relationships. Often genetic researchers jump to conclusions about plant relationships without completely understanding all the genetics. Once she accepted the changes, she had to find morphological characteristics to support them. "So far," she said, "I have always found a way to do this."

Photo courtesy of Jennifer Ackerfield

"I never had second thoughts about writing a flora", she said. "If no one wanted to use it, it would have been useful for me and my students, and that was enough for me."

So now the book is formatted and ready to publish. All Jennifer needs to do is to raise the money for the printing. As of this writing, over 200 people have pre-ordered a copy of the flora, and several organizations including CoNPS have donated funds, getting her two-thirds of the way there.

Already, she is making plans for the second printing. "I would like to have botanical illustrations of key characteristics in the margins, the way Jan Wingate does in her *Illustrated Keys to the Grasses of Colorado*", she said. "I just wanted to create a *Flora* that nearly anyone with a little bit of botanical knowledge could pick up, use, and key out a plant with confidence and success."

The Manual of the Plants of Colorado by Harold Harrington

Jennifer Ackerfield's *Flora of Colorado* will be the first manual of the Colorado flora containing both keys and plant descriptions to the species level since Harold Harrington wrote his classic book, *Manual of the Plants of Colorado,* published in 1954 with a second printing in 1964. Both Ackerfield and Harrington produced their books while working at Colorado State University in Fort Collins, Colorado and both produced floras covering the entire state.

Photo courtesy of
Colorado State University Herbarium

Harold D. Harrington (1903-1981) received his PhD in Botany from the University of Iowa. He was hired as an assistant professor of botany at Colorado A & M (which later became Colorado State University) in 1935. After a few years, he spent a short time teaching at Chicago Teachers College and returned to CSU in 1943, where he stayed until his retirement in 1968. In addition to the *Manual of the Plants of Colorado*, Harrington is known for a variety of publications including *How to Identify Plants, How to Identify Grasses and Grasslike Plants,* and *Edible Native Plants of the Rocky Mountains*.

Harrington's wife, Edith Jirsa Harrington, was also a botanist and helped her husband with collecting plants, photography, and the preparation and typing of the manuscript for the *Manual of the Plants of Colorado.*

References

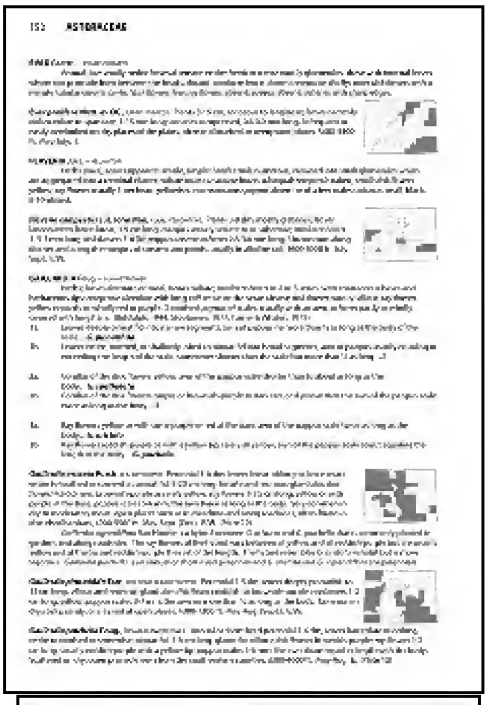
Anderson, Berta. (1981). Dr. Harrington, A Premier Botanist. *Green Thrumb*. 38 (3): 86-89

Colyer, Marilyn Ritter. (2009). Memories of a Colorado Botanist: H.D. Harrington. *Aquilegia* 33(1): 3-4.

Note: Harrington's *Manual* is still available through the CoNPS Bookstore as a CD thanks to the efforts of Patrick Murphy. (*Aquilegia,* 26(1), Spring 2002, p. 4)

CoNPS Fund Raising Campaign
for Jennifer Ackerfield's *Flora of Colorado*

This is much more than easy-to-use keys. It is also a comprehensive guide to all of the vascular plants of Colorado with detailed descriptions, distribution maps, habitat information, flowering times and elevation ranges for every species. Color photographs are included for about a third of the species, including those most commonly encountered and those most difficult to identify. Photographs of important diagnostic features are another helpful feature.

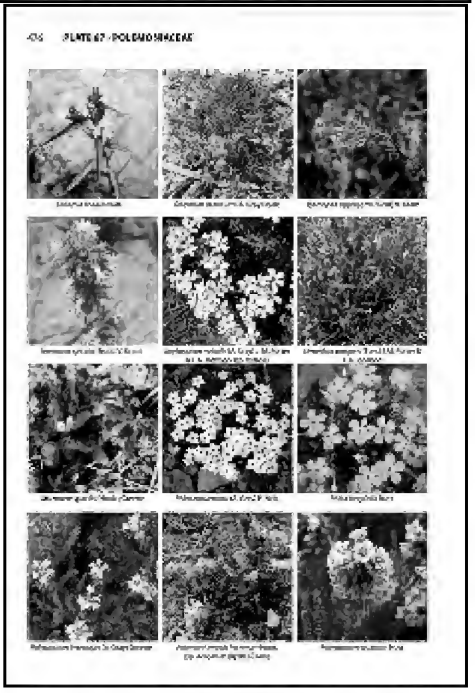


Ackerfield's primary objective is to make the identification and appreciation of Colorado's native plants accessible to almost anyone. Part of that process has been the field testing of the pre-published keys, first by her students, and then by experts and amateurs alike. The couplets in the key use easy-to-discern features to differentiate plants and the book follows the nomenclature used in *The Jepson Manual: Vascular Plants of California, Thoroughly Revised and Expanded* that was published in 2012.

This book is large (see spec's on the publisher's website) because it includes the entire state – both the Eastern and Western slopes, in a single volume. It is surprisingly affordable at $65, especially considering all of the color photography.

Flora of Colorado is the first new manual of Colorado plants since the 1954 publication of Harrington's *Manual of the Plants of Colorado*. What does that mean? As defined in Walters & Keil's *Vascular Plant Taxonomy*, 4th ed., "In addition to keys, a manual includes a description for each family, genus, and species, and some manuals provide descriptions for taxa of other ranks as well."

It's completed and ready to go to print, with availability planned for spring of 2015. Before that can happen, however, the publisher requires a number of pre-orders that will help cover the cost of printing. By buying the book NOW, you can help get it printed and out-the-door, as scheduled. Don't forget that you can also make donations to the CoNPS *Flora of Colorado* Fund to help fund the printing of the book!



More funding is needed in order to print the book.

How can you help? There are 2 ways:

Pre-Order a Copy

http://shop.brit.org/products/coloradoflora
The price is $65 which is a bargain!

Make a Donation

Your donation is tax deductible:
Send to CoNPS -- Flora of Colorado Fund
P.O. Box 200, Fort Collins, CO 80522

Jennifer will be donating half of the proceeds from the sales of the book to establish an endowment for the CSU herbarium.
CoNPS has contributed $1,000 toward the publication of the *Flora.*

Due to be published Spring 2015

Make it happen by pre-ordering a copy NOW--and make a donation, too!

In Wildness Lies the Preservation of Our Economy

by John Giordanengo

Centuries of economic policy have focused on constructing a hulking house atop a wobbly foundation. Rest assured we cannot simply blame policy makers for such a monstrosity, as we have all nurtured an economic model that now has the appearance of a Rube Goldberg diagram. Fifty years ago American policy makers did get one thing right, even if they did not recognize the full genius of their decision at the time. In 1974 they signed into law the 'Wilderness Act', resulting in the protection of 750 patches of ecosystems, the very harbors of life in the universe.

Photo by Nanette Kuich

Protected by nothing more than political fences beyond which chain saws and off-road vehicles are forbidden to venture, these patches of wild forests, meadows, and rivers harbor something greater than mere beasts and blossoms. They protect an even more complex element, one critical to the health of our economy. And whereas fences capable of protecting wilderness areas from the economically molded habitats beyond do not in reality exist, this critical element is at risk. Looming across the wilderness boundary lies a quilted landscape of cement, trees, farms, buildings, and weeds—referred to by ecologists as "the matrix"—whose wastes and wares cannot be kept from the wilderness areas they encircle. The spread of exotic weeds provides ample proof of this. And originating from our cities and farms are megatons of nitrogen, mercury, sulfur, and hundreds of other pollutants known to contaminate plant communities and fisheries seeking refuge within wilderness. Fire suppression policies too result more often than not in decrepit forests, ripe for more intense and costly fires than are desirable for wilderness or economy.

The diversity of economic products that persistently degrade the very wildlands responsible for the clean water, pure oxygen, and myriad other ecological services upon which we all rely is seemingly infinite. And ironically, herein lies the hope. Not only is the health of our economies dependent upon the health of the ecosystems in which it exists, but these same ecosystems provide a proven model for a more robust economy. A simple elaboration upon America's current approach to high-tech problem-solving may be all that is required to effect such a model.

For centuries engineers and scientists have borrowed designs from nature to create better products for the human economy: the wing of an airplane; Velcro; adhesives that mimic a gecko's gripping tipi-toes; navigation technology and medical imaging inspired by a bat's echo-location abilities; sharkskin-inspired swimsuits and ship hulls; turbine blades modeled after whale fins to reduce drag and increase lift…the examples of biomimicry are numerous. Building on the success of scientists and engineers to model individual components of nature for the benefit of industry, a logical next step is to apply the design principles of nature's most complex system to our economy. Such a system is best illustrated by an untouched wilderness ecosystem that over the course of epochs has demonstrated an ability to fully meet the needs of billions of inhabitants with the slightest of resources.

So homologous are ecosystems and economies that naturalists the likes of Charles Darwin borrowed the phrase the economy of nature from economists of his day to describe the complexities of the natural systems they studied—before the term ecology existed. Like ecosystems, our economy functions as a result of myriad and complex interactions between component parts. Further, economies and ecosystems are nested one within the other, with interdependencies and feedback loops existing at all levels, from cellular to biosphere.

So interconnected are these nested systems that a policy maker becomes quickly perplexed imagining how one system may survive absent the other. Consider the circulatory system, one of several vital systems in your body. Envision for a few seconds your heart persisting independent of your body. Indeed, this is as ridiculous a notion as believing your body can persist absent its heart. Fortunately, having long understood the relationship between a healthy heart and body, our species has thrived: humans forming communities, communities evolving into complex cities, and cities growing more dependent upon one another in an eternal struggle to construct a self-serving economic system.

Modern day ecologists toil continually to better understand the same ecosystem mysteries that stumped early naturalists such as Charles Darwin, Alexander von Humboldt, Gregor Mendel, and others. Among the earliest processes studied in ecology, plant community succession describes the stages an ecosystem experiences following a profound disturbance. Picture the advance of a glacier through a valley—wiping it clear of trees, wildflowers, and worms—and the subsequent retreat of that glacier, leaving in its path little more than cobble and grit. The pioneer community of plants recolonizing the rubble as the glacier retreats up valley

exhibits several properties exhibited also by our fledgling economy. In contrast to the mature forest that will require a century or more to retake the valley, the pioneer plant community is low in diversity and inefficient in its use of resources. Gross primary production, nature's equivalent of gross domestic product, is depressed in the post-glacial community. And as with our nascent economy, the young pioneer system lacks stability.

Knowing the processes of succession well, restoration ecologists have succeeded in stimulating more diverse, stable, and productive systems in a far shorter time frame (years) than what natural processes could otherwise achieve (centuries). Succession is but one of dozens of principles the economist may freely borrow from the ecologist to re-craft an economy that meets societies much-celebrated economic goals: efficiency, equity, full employment, security, stability, freedom, and growth. And taking a cue from ecological restoration, there is no need to wait a century or more for our economy to evolve on its own to become self-sustaining.

Yet the question remains, "How on Earth do we alter the course of something as colossal as The Economy?" Ah, in nature too lay lessons for such a feat.

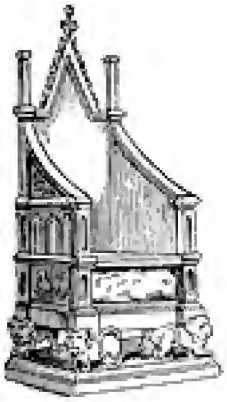
In celebration of the 50th anniversary of the Wilderness Act, this series of articles on "Growing In: The Natural Path to a More Robust Economy" will explore the governing principles of the most efficient and resilient systems on Earth. This series will explore how wilderness ecosystems use and cycle energy, the roles of competition and collaboration in optimizing productivity, the part diversity plays in maintaining system resilience, the job evolution has in the advancement of a system, and decisively what Growing In means for the health of the one world we know to harbor life, people, and our economies.

After 17 years of experience in ecological restoration and natural resources (City of Boulder, Wildlands Restoration Volunteers, Colorado Fourteeners Initiative), John Giordanengo founded AloTerra Restoration Services as a means to expand his commitment to ecological restoration and conservation. He completed his MS in Rangeland Ecology from CSU in 2000 and has helped to plan and implement over 160 restoration-related projects from the plains to alpine environments of Colorado.

Planet Taxxa: a Fable
by Dick Yeatts

As a physicist, Dick finds the botanical approach to naming quite odd and has written this tongue in cheek article for your amusement.

Once upon a time on a planet far, far away, called Taxxa, lived a people, not unlike us, but with significant physical and cultural differences. Physically, the Taxxons come in a great variety of sizes and shapes - much more than we do - which leads to significant challenges in clothing and home furnishings. Culturally, the Taxxons are united in a single language in spite of distinct regional differences. But one linguistic trait is universal: they understand that proper nouns denote condition rather than identity. For instance, when a Taxxon visits a doctor, his or her name is changed in accordance with the diagnosis. The complications we see in this system are considered natural to the Taxxons; they expect, indeed, look forward to, many name changes during their lifetimes.



Chair illustration courtesy The Florida Center for Instructional Technology, fcit.usf.edu

Objects are named according to form and function - much like we do, only more so.. Chairs, now, are especially important to the Taxxons because they must accommodate the great variety of shapes and sizes of the Taxxons themselves. Manufacturers, of course, are quick to change the name of a chair following a change of style, even if that change is minor, to call attention to their product. Whether a style change is sufficient to allow for a name change can be a matter of contention.

On Taxxa, there are important and highly respected public officials called Phyloganists whose duties including tracking all name changes for purposes of taxation and pedigree. They are also charged with keeping the records straight with regard to objects. Moreover they are charged with arbitrating disputes over names.

Different manufacturers are known to concoct similar names for similar products. Returning to the case of chairs, Phyloganists, in turn, occasionally disagree on what name should stand for the latest style of a particular chair: One Phyloganist might find that a new color should evoke a new name (or even the reuse of an old name), while another might require a change more substantial. Taxxons, now, are tolerant of name changes, even looking forward to them; but they are very intolerant of disagreement between Phyloganists.

Disagreements between Phyloganists are referred to the Taxxononical Court where adversaries are challenged to reach agreement on a new name. If not, the discordant Phyloganists are found guilty of Unmitigated Subjectivism, properly disciplined ... and the old name stands. All Phyloganists realize, philosophically, at least, that if they agreed upon what it means to be "chair" most of their disagreements would disappear. But most Phyloganists are too busy with the day-to-day vocabulosity to contemplate fundamental issues.

Recently, it has become useful to consider the materials of construction when devising a name. For chairs, in particular,

this has usually been a helpful strategy. But some Taxxons were annoyed, for instance, when a chaise lounge was cataloged as a bench.

The condition-based naming system of the Taxxons has led to auspicious confusion which has both positive and negative consequences. Because arguments between Taxxons necessarily reduce to semantics (and Taxxons are above arguing over mere words) violence rarely occurs on Taxxa. On the other hand, benign confusion impedes progress. Invention, both material and social, is confounded by the enormous lexicon of names and their etymologies. Taxxons believe that trudgency is normal, so they live happily ever after.

Dick Yeatts is a retired physics professor from the Colorado School of Mines. Never one to sit still, physically or intellectually, Dick helps with genetic research at Professor Leo Bruederle's lab at the University of Colorado, Denver. Dick has an interest in plants and fibonacci numbers and continues to publish articles in scholarly journals.

Popovich (Continued from page 12)

confirmed the restricted soil substrates on which these lichens occur.

Third, Marike (Mari) Majack surveyed for rare aquatic plants as part of her Master's Thesis at University of Colorado, Denver, under the tutelage of Dr. Leo Bruderle. In 2014, Mari surveyed for rare aquatic plants on Forest Service lands. In 2013 and 2014, Mari visited a total of 152 wetland sites in north- and west-central Colorado, and documented 52 new populations, 14 of 16 native pondweeds, and about 35 county records! Wow! Among other finds, the following Forest Service Sensitive or Colorado Natural Heritage Program-tracked rare plants were encountered: Robbin's pondweed *(Potamogeton robbinsii)* in Delta County, a State record!; largeleaf pondweed (*P. amplifolius)*; waterthread pondweed *(P. diversifolius)*; whitestem pondweed (*P. praelongus)*; other pondweeds (*Stuckenia* spp.); lesser bladderwort (*Utricularia minor)* and possibly yellowish-white and common bladderwort (*U. ochroleuca* and *U. macrorhiza*, respectively); twoheaded water-starwort (*Callitriche heterophylla*); western waterweed (*Elodea nuttallii)*; and spiny-spore quillwort *(Isoetes tenella*). Furthermore, she documented several new occurrences of rare aquatic plant communities tracked by the Heritage Program. Mari also took beautiful and clear close-up photographs of many of these aquatics, often showing diagnostic parts. Mari received a CoNPS Marr Research Grant for over $1,000 in 2013 to study the distribution of Potamogetonaceae in Colorado.

Survey results show the amazing amount of knowledge that can be gained simply by focusing on proactive surveys for targeted rare plants. The amount of funds expended by these individuals was indeed small compared to the amount of survey work and species knowledge gained. A little money can go a long way! As field studies chairperson, I am delighted to see such work endorsed by federal land management agencies, CoNPS, and the University of Colorado. Results of all three survey efforts were presented at the 11th Annual Rare Plant Symposium held last fall in Ft. Collins. The PowerPoints are available on line at the Colorado Natural Heritage Program website where the minutes from the 2014 symposium are posted.

Borland (Continued from page 18)

These seed were grown out and planted outdoors in rows in Palisade, Colorado (4,700' elev.) for the first round of selection for desired qualities. This is when a curious thing was noticed. Colors other than blue began showing up among the predominately blue and white flowers. Flowers of individual plants were displaying shades of red, or yellow or purple. Jesse was certain that these colors did not appear in any wild population when the seed was collected and that no other species of *Aquilegia* existed within many, many miles of the seed collection sites. Adulteration by pollen of another differently colored species could not have happened.

Though there were still plenty of blue and white flowered plants in the field, these could no longer be used for breeding purposes due to possible adulteration by off-color flowers. The breeding trials, therefore, were brought indoors where pollinating insects could be eliminated. Again, plants grown from the original wild collected seed resulted in some plants exhibiting colors other than blue and white.

Although the original breeding goal was not as straight forward as first anticipated, the off-colored types could be stabilized for separate color combinations and the colors intensified. A series was developed of seed grown, separately colored *Aquilegia*s known as the Songbird Series.

This story was amplified by another experience with a visit to Dean Swift, a seed collector and grower in Jaroso (7568' elev.) in the San Luis Valley. Dean was growing in furrow irrigated fields about a third of an acre of *Aquilegia caerulea* from wild collected seed. His just blooming plants were enormous, 3 feet tall, two or more feet wide and thick with abundant stems. Here too, atypical colors appeared. Wanting to maintain as pure a strain of blue and white flowers as possible, we walked the field pulling out the off color plants and heaved them to the side of the field.

A couple of questions arise from these two experiences.

1) Why do the colors red, purple and yellow not appear in high elevation populations of *Aquilegia caerulea*?

2) What is the mechanism involved in the expression of other colors at lower elevations?

3) Is elevation or higher intensities ultraviolet light involved in the expression of flower color in *Aquilegia caerulea*?

4) If a differently colored first generation plant grown at a low elevation were planted to a high elevation, would the flower colors revert back to the parent blue and white?

If anyone can shed some light on these questions, please send your responses to FloraWest@q.com.

Marr Research Grant Study

Cheatgrass: The Biology of an Ongoing Invasion

By Robin Bingham, Caley Gasch, Robin Jones, Jenny Kapp, and Brooke Lockard

Photo by Caley Gasch

Bromus tectorum, downy brome or cheatgrass, is a Eurasian native which has been aggressively invading the western United States since the late 19th century (Mack and Pyke, 1983). Since its arrival, cheatgrass has rapidly expanded its range, quickly becoming the dominant plant across at least 200,000 km^2 of steppe community between the Sierra Nevada and the Rocky Mountains (Mack and Pyke 1983, Mack and Pyke 1984, Novak and Mack 2001). Because of the scope and extent of this invasion, cheatgrass is widely considered by scientists and land managers to be perhaps the most significant plant invader in North America (D'Antonio and Vitousek 1992).

When I first arrived in Gunnison in 1997, it was generally thought that our climate, high elevation, and relative isolation would limit the spread of cheatgrass into the Basin. Sadly, this has not been the case, and although here it still isn't a dominant presence, as in other parts of the intermountain west, anyone who has walked through a community devastated and dominated by cheatgrass will share my fear that it may only be a matter of time before our landscape is similarly transformed.

Cheatgrass is a winter annual, self-pollinating grass. The majority of its seeds germinate in the fall, but seeds can also germinate at almost any other time of the year. It has a small, ephemeral seed bank and all vegetative growth occurs within one annual cycle. Seeds germinate after autumn rains, develop a rudimentary root and shoot system, and then over-winter in a quiescent state before the plant resumes rapid growth in late winter and spring. Plants reach full vegetative and reproductive maturity within six to eight weeks and each adult plant is capable of producing over three hundred viable seeds.

Although cheatgrass has been present as an aggressive invasive species in the western United States for almost 125 years (Mack and Pyke 1984), it has only recently begun expanding its range to higher elevation sites in the Rocky Mountains (Bromberg et al. 2011). Consequently, the high elevation sagebrush ecosystem that exists within and around the Gunnison Basin is increasingly vulnerable to a large scale invasion by cheatgrass. Our observations confirm its recent expansion over the past 14 years.

A goal driving much of the research on cheatgrass is to understand the genetic mechanisms behind this successful expansion into diverse ecosystems including those at high elevations. The ability of cheatgrass to adapt to such diverse environments is a surprise given that, as expected in a self-pollinating plant, genetic variation appears to be very low (Bartlet et al. 2002, Meyer and Allen 1999). However, genetically variable individuals have been reported from populations in the US and Canada, which may have been produced through occasional, but rare, outcrossing events. Furthermore, multiple independent introductions to North America have contributed to genetic variation across its introduced range and may facilitate its invasive success and adaptation to novel habitats (Schachner et al. 2008). Because of this recent shift in areas threatened by cheatgrass, it is essential to the protection and preservation of the native plant communities that exist at high elevations throughout Colorado that we increase our knowledge of cheatgrass invasion dynamics.

Photo by Caley Gasch

My students and I have been watching the progress of cheatgrass invasion into the Gunnison Basin since the early 2000s, and have investigated several aspects of cheatgrass biology including seed germination, impacts of mycorrhizal interactions on competition dynamics with native grasses, population genetic differentiation, and the presence of fungal pathogens that attack cheatgrass seeds. In the following paragraphs I will briefly summarize some of this work.

Seed Germination

The goal of our germination study was to investigate whether or not cheatgrass populations within the Gunnison Basin show variation in seed germination characteristics which might be interpreted as adaptation to local environments. Specifically, we asked whether there were differences among populations in their ability to germinate at different temperatures, and if seeds from different populations varied in their degree of dormancy.

Cheatgrass seeds are dormant when dispersed and lose dormancy through after-ripening. The process of after-ripening may serve as a safeguard against premature germination, allowing the seeds to avoid germination in times of dry late summer conditions. Selection for optimal germination time (thus avoiding unfavorable seasonal conditions) may result in the evolution of germination ecotypes wherein dormancy duration is an adaptation to a specific environment (Beckstead et. al 1996). If this is the case, we would expect to see habitat-correlated differences in seed germination.

In July 2003, Western State student Caley Gasch collected cheatgrass seeds from each of four populations within the Gunnison Basin and tested these seeds for their ability to germinate under three different temperature regimes, as well as after different periods of after-ripening (Gasch and Bingham, 2006). Seeds in storage for zero weeks (recently harvested) had low percent germination, while seeds in storage for 16 weeks (after-ripened) had high percent germination. Recently collected seeds from all populations exhibited very low percent germination at the 5:10 °C temperature regime (10% or less), in contrast to other studies which have reported higher germination (less dormancy) at low temperatures (Beckstead et al 1996). Furthermore, in our study, seeds from the highest elevation populations (over 9,000 ft) exhibited significantly lower germination at low temperatures (5:10 °C) as compared to those from lower elevations (~7000 ft) (Gasch and Bingham, 2006). We speculate that since cold temperatures are likely any time throughout the summer at high elevations, delayed germination at the 5:10 °C regime may reduce the risk of precocious germination in high elevation populations. From these results, we concluded that cheatgrass populations in the Gunnison Basin exhibit significant differences in germination characteristics, and that these differences may indicate adaptive responses to local environments. Additional studies are planned to determine if the results of this study can be replicated.

Mycorrhizal Interactions

Caley Gasch also investigated the role of mycorrhizal interactions on competition dynamics between cheatgrass and native grasses. Arbuscular mycorrhizal fungi (AMF) are root symbionts that enhance water and nutrient uptake by their plant host, and as such play an important role in facilitating the colonization of disturbed areas by both native and non-native plant species. *Pascopyrum smithii* (western wheatgrass) is a native grass that coexists with cheatgrass and associates with arbuscular mycorrhizal fungi. Cheatgrass forms weak mycorrhizal associations and can lead to altered AMF conditions in the soil (Busby, 2011).

To address the question of how cheatgrass alters AMF interactions with native species, we grew cheatgrass and western wheatgrass together and separately, and with and without a commercial AMF inoculant. Within the AMF-treated plants, we found that cheatgrass height and mass were not affected by the presence of a competitor, while western wheatgrass height and mass significantly decreased when grown with cheatgrass. Western wheatgrass also showed significantly lower percent root colonization by AMF when grown with cheatgrass as compared to when it was grown alone. In contrast, percent root colonization by AMF in cheatgrass did not significantly change between single species and mixed species treatments. Similar to conclusions from other studies (e.g. Busby, 2011), our findings suggest that a better understanding of the effects of cheatgrass on AMF communities could enhance our ability to restore lands degraded by cheatgrass invasion through managing AMF soil communities.

Population Genetic Differentiation

The success of cheatgrass as a selfing plant raises questions regarding the genetic structure of introduced populations. Previous studies in other regions have obtained surprising results showing cheatgrass to have substantially more genetic diversity within populations in its introduced range than in its previous range (Novak and Mack 2001). This is surprising because introduced populations typically experience "founder effects" resulting in very low genetic diversity both within and among such populations. In the case of cheatgrass however, unexpectedly high levels of genetic diversity may be attributable to multiple introductions as well as occasional outcrossing (Schachner et al. 2008). Because the Gunnison Basin is at somewhat of a crossroads, with tourism traffic arriving from all directions, we predicted that genetic evidence would support the hypothesis that populations of cheatgrass in the Basin exhibit relatively high levels of genetic differentiation as a result of multiple introduction events from different locations.

Several Western students have worked on this project since 2004 including Jenny Kapp and Robin Jones. In the summer of 2002, we collected seed samples from each of 30-100 plants from 13 Gunnison Basin populations. Seeds were obtained from diverse sites representing the complete geographic range occupied by cheatgrass across the Basin. Seeds were germinated and seedling tissue analyzed for evidence of genetic variation. Our results were comparable to those reported in other studies, with overall very low levels of variation within populations as expected from a primarily self-pollinating plant such as cheatgrass. However, we did find evidence that populations from different locations within the Basin are genetically distinct. This supports the hypothesis that our populations are the result of multiple independent introduction events, followed by low levels of genetic mixing among these populations.

These findings raise concern, since it is possible for a genetic "type" to be introduced that has characteristics facilitating adaptation to the Gunnison Basin environment. Furthermore, mixing of genetically distinct populations could result in greater genetic variation in which selection and adaptation to novel environments may be enhanced.

Fungal Pathogens

Recent research by Susan Meyer of the USFS and Julie Beckstead from Gonzaga University has explored the use of naturally occurring pathogens, including *Ustillago bullata,* and *Pyrenophora semeniperda,* as biocontrol agents for cheatgrass. Western State student Brooke Lockard took a strong interest in this question and in 2012 and 2013 investigated the extent to which populations of cheatgrass around Gunnison are infected with these two pathogens. Her goal was to survey cheatgrass populations in the Gunnison Basin across a variety of elevations and habitats to determine whether these fungal pathogens are present as well as the extent of population infection. Her survey included ten sites located throughout the area. Out of the ten sites, *U. bullata* was found at one site and *P. semeniperda* was found at six sites. Brooke's work contributes to our understanding of natural population controls on

Pyrenophora semeniperda infected cheatgrass seeds Photo by Brooke Lockard

cheatgrass and supports efforts aimed at finding an effective naturally occurring biocontrol agent for this invasive winter annual grass.

How to eradicate cheatgrass

If you find cheatgrass on your property, I urge you to take immediate measures to eradicate it. Cheatgrass goes through distinctive developmental stages that are easily recognized by their color. Early in the season the plants are bright green, and as they mature they turn a vivid purple/maroon. With seed drop and senescence the plants turn tawny yellow/tan (at which point the seeds have dispersed). A small to medium patch can be easily pulled in the spring or early summer before the seeds mature and while the plants are still green. You probably want to avoid trying to pull the plants in mid to late summer after they begin to senesce, as this will just promote seed dispersal which is what you want to avoid. If you have a secure place to burn the pulled plants (like in a contained trash can or barrel), that will destroy them. Putting them in a sealed garbage bag and dumped in a landfill is another option.

If you have a major infestation and hand pulling is not practical there are herbicides that are effective when used appropriately. Plateau is a broad-spectrum herbicide that provides control of cheatgrass. Plateau is most effective when applied in late summer or fall prior to seed germination. The selective activity of Plateau allows desirable native grasses and forbs to re-establish after treatment. Prescribed burning is not-recommended as a control for cheatgrass as fire tends to enhance cheatgrass success.

If you find cheatgrass on your property, I urge you to take immediate measures to eradicate it. A small to medium patch can be easily pulled in the spring or early summer before the seeds mature and while the plants are still green. You probably want to avoid trying to pull the plants in mid to late summer after they begin to senesce, as this will just promote seed dispersal which is what you want to avoid.

Concluding thoughts: In September my family and I were returning from a soccer game in Paonia. As we climbed from Hotchkiss on Highway 92 toward the Black Mesa and back to Gunnison, I watched the landscape past my window. The hillsides were a uniform tawny gold, blanketed with the past season's growth of cheatgrass here and there broken by gnarled branches of struggling sagebrush. If you didn't know better, you might think it was kind of pretty with its warm autumn glow in the late afternoon light, the seed heads waving gracefully in the breeze. Around Gunnison, in contrast, it is pretty innocuous, an innocent patch here and there along a roadside or trail, the proverbial wolf in sheep's clothing. However, we can't be complacent in our "pristine" high elevation valley just a few hours' drive away. The invasion is underway.

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Robin Bingham, PhD, is a Professor in the Department of Natural and Environmental Sciences, Caley Gasch, Robin Jones, Jenny Kapp, and Brooke Lockard performed this research while they were Dr. Bingham's students at Western State Colorado University, Gunnison, CO.

This research was funded in part by a Marr Research Grant from the Colorado Native Plant Society.

BOOKS & MEDIA REVIEWS

High Plains Horticulture: A History

Review by Sarah Myers

High Plains Horticulture: A History by John F. Freeman

University Press of Colorado, 2008.

High Plains Horticulture provides the reader with a thorough history of horticulture in the High Plains states of CO, WY, SD, NB, KS, covering more than 120,000 square miles. While published by a university press, this book could serve as both textbook for serious horticulture students and professionals, as well as casual gardeners. Offering both introductory level facts and historical context, the book also covers federal and state laws that affected the High Plains states throughout the "coming of age" of these lands. Ever wondered why we see living snow fences and tree wind breaks? Readers will learn about the series of events leading to these important landscape elements across the West. Find out how pioneers and soldiers survived in the early colonies and forts like Laramie, Fort Collins, and the Union Colony. Curious about how and when flowers and ornamentals began filling our landscapes? Inquisitive about existing orchards and the history of now-ghost orchards ("I always heard there used to be an orchard here…."). These histories and stories of horticulture and survival in the west fill the pages of Freeman's authoritative work. The book is neither a how-to-guide, nor a study of commodity farming or ranching. Freeman does the work of a good historian and allows the reader to learn from the historical context and explains what grew in the past and what did not. He also discusses the individuals who made efforts to advance horticulture in this region.

This book examines the "civilizing role of horticulture" and its part in settling the west, which was previously known as a desert and barren; it was thought the area would not support the production of food crops, much less any civilized flowers or ornamentals. Freeman shows the rich history, depicted in stories of horticulture development, in key places on the High Plains, and demonstrates that contrary to the belief that nothing grows in the west, history proves otherwise with gardening and horticulture literally blossoming in the High Plains region over the course of its settlement. The cultivation of fruits, vegetables, trees, and ornamentals did prove successful, thanks to the work of key individuals and communities in the High Plains region.

The book covers the time period of the early 1800s to present, starting with Zebulon Pike in 1806 and his explorations into this region. Pike reported the area to be barren. In 1820, Major Stephen Long said the area was "unfit for cultivation" and the area became known as the Great American Desert. Freeman gives background on the etymology of "horticulture", and paints the portrait of the early settlers to the region as demonstrating the imagination and perseverance to create livable spaces. Instrumental in this process was the creation of the Hatch Act in 1887, which set forth land grant institutions across the country and particularly in the High Plains region.

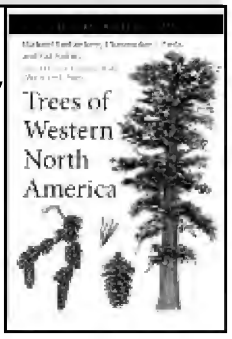
Freeman notes that many have lost touch with the soil, through the loss of the family farms as well as the farming way of life, but there is hope that we can all garden on different scales, making our surroundings more enjoyable, beautiful, and productive. By knowing the history of horticulture in our region, we can understand the lessons of the land, as well as appreciate the hard work of horticulture predecessors, and the value of land grant institutions and research stations across the High Plains. Readers will relish this book's detail, depth, and breadth and gain an understanding of how and why we now see trees, parks and gardens that beautify the High Plains states.

This book offers both a historical and cultural perspective, with enough scientific and technical information to entice all levels of horticulturists, from beginners to experts. It is helpful that Freeman uses both common and scientific names.

Reviewer: Sarah Myers is a member of the Northern Chapter of CoNPS who works with information and research for a non-profit association and enjoys native plant study, gardening, birding, writing, music, hiking, and all outdoor activities in her free time.

Trees of Western North America

Review by Jim Borland



Trees of Western North America

by Richard Spellenberg, Christopher J. Earle, and Gil Nelson

Princeton University Press, 2014.

'Western' in this book includes all the lands west of the 100th meridian, north and south of a line bisecting North and South Dakota, south through Texas to the Gulf Coast. Inside these boundaries 630 species of plants are described with "a single woody stem and a well-defined crown of branches along with a number of plants generally taller than a human that may be thought of as shrubs, often growing with multiple trunks." Both native and naturalized trees are included in addition to a sampling of "prominent cultivated street and garden trees".

Introductory material includes 11 pages of tree biology and a leaf key for both conifers and flowering plants, the latter of which consists of pages of somewhat impressionistic

representations of small scale, sample leaves. Throughout the book each species is likewise illustrated in overall form, flowers, bark and fruits. Species are arranged alphabetically by family, some of which may require some searching since many genera are no longer found in their familiar families. *Acer* and *Aesculus* for example, are now found in Sapindaceae, *Sambucus* in Adoxaceae, *Tilia* in Malvaceae, *Yucca* and *Nolina* in Asparagaceae, and *Celtis* in Cannabaceae. Adherence to the new discoveries in evolutionary relationships via DNA and chemical analysis is not complete, however and some "old" relationships remain the same for convenience – a tactic taken by many modern authors for reasons that the reader can ascertain for him or herself.

Detailed physical descriptions of each species includes a habitat/range map and occasional interesting notes. Did you know that Redwood forests have more biomass per unit than any other ecosystem in the world; or that one of the largest Giant Sequoias was estimated to bear 2.8 billion leaves; or the single needles of *Pinus monophylla* are derived from a fusion of 5 needles and that it is the only single needled pine in the world?

The reader might also find it interesting, as did I, what species are considered trees by the authors. Some of the surprising entries and their heights are: *Dasylirion wheeleri* (2m), *Nolina bigelovii* (2.5m), *Opuntia leptocaulis* (1.8m), *Ceanothus velutinus* (6m) [I have to get one of these], *Cercocarpus intricatus* (2.5m), *C. montanus* (6m), *Purshia stansburiana* (7.5m) and *Rhus microphylla* (5m). Omitted, though fitting the author's tree definition, are *Rhus trilobata* (*R. aromatica* ssp.trilobata) and *Forestiera neomexicana.*

There is a very interesting discussion of a complex of oaks found in the highlands of the southeast corner of this state. Here one will find a taxonomist's nightmare and a horticulturist's paradise of oak sizes and shapes from ground covers to trees, leaf shapes wavy, lobed and pointed, and sometimes edible acorns. In a full page diagram the authors present a conception for the hybridization of 6 oak species with *Quercus gambelii* with all the progeny called *Quercus* x *undulata*.

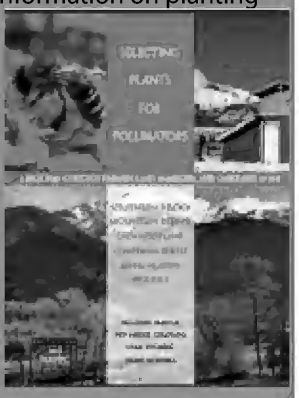
For that subset of plant aficionados interested in the more arboreal members of our flora, this book should fill that bill. I have come away with a whole new set of what will probably be marginal plants to search out and try.

Reviewer: Jim Borland is a horticulturist, radio personality, photographer, former president of CoNPS, and columnist (Garden Native) for *Aquilegia*. See more about Jim on page 18.

Selecting Plants for Pollinators:

A Regional Guide for Farmers, Land Managers, and Gardeners in the Southern Rocky Mountain Steppe, Open Woodland, Coniferous Forest, Alpine Meadow Province

The Pollinator Partnership has produced a large number of online regional guides that provide information on planting pollinator gardens and containing lists of plants for different regions. Colorado is divided up into a number of regions. The guide listed above is only one of the guides that applies to Colorado. A free PDF of this guide is available online at http://pollinator.org/PDFs/Guides/SRockyMtStepperx3FINAL.pdf



The other guides that apply to Colorado may be found at http://www.pollinator.org/guides.htm. You can search for guides for your area by zip code. I checked and the guide that covers the city Limon, Colorado, is still in production.

To find nurseries and seed companies offering native plants, the site directs the user to www.nativeplant.org

AQUILEGIA: Newsletter of the Colorado Native Plant Society

Aquilegia is the newsletter of the Colorado Native Plant Society and is available to members of the Society and to others with an interest in native plants. Four regular issues are published each year (Spring, Summer, Fall, Winter) plus a special issue for the Society Annual Meeting held in the Fall.

All contributions are subject to editing for brevity, grammar, and consistency, with final approval of substantive changes by the author. Articles from *Aquilegia* may be used by other native plant societies or non-profit groups, if fully cited to author and attributed to *Aquilegia*.

The deadline for the Spring issue is March 1. Announcements, news, articles, book reviews, poems, botanical illustrations, photographs and other contributions should be sent to Jan Loechell Turner, Editor, at JLTurner@regis.edu

Aquilegia Staff: Jan Turner, Charlie Turner, Sally L White, Linda Smith, Rob Pudim, John Vickery, Nan Daniels, Mo Ewing, Sarah Myers, and Jim Borland.

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Membership	vacant	
Research Grants	Catherine Kleier	ckleier@regis.edu
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Workshops	Ronda Koski	conpsworkshops@gmail.com

Colorado Native Plant Society
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Field Trip Leaders Needed!
Contact Chapter President!

Marr and Steinkamp Research Grant Proposals are due February 20, 2015!

CoNPS CALENDAR

FEBRUARY 2015

Feb. 12 Floristic Inventory of White Rocks Open Space, 6:30 p.m. (B)
Feb. 14 Sunflower Family Workshop, RMAWR, 9 am-3 pm
Feb. 15 Sunflower Family Workshop, RMAWR, 9 am-3 pm
Feb. 20 Deadline for CoNPS Research Grant Proposals
Feb. 19-21 Colorado Environmental Film Festival, Golden
Feb. 24 Extreme Rich Fens, Englewood 7 pm (D)

MARCH 2015

March 5 Partnering with the ESN, (N)
March 7 How to Collect Native Plants Workshop, 9 -4, Fort Collins
March 11 Wildflowers in Ecuador(SJ)
March 10-12 High Altitude Restoration Science & Practice Conference, Fort Collins
March 12 Roadside Botany and What Grows Where, 6:30 (B)
March 14 How to Collect Native Plants Workshop, 9 -4, Golden
March 14 Western Landscape Symposium, Pueblo
Mar. 24, Tues. U.S. 36 *Spiranthes* Migration, 7 pm (D)

APRIL 2015

Apr. 9 BoCo post-flood riparian study (B)

Apr 13-16 National Native Seed Conference, Santa Fe, NM
Apr. 25 Grass ID Workshop, Castle Rock, 9 am-3 pm
Apr. 25-26 AZNPS Annual Meeting, Museum of Northern Arizona, Flagstaff, AZ
Apr. 28 Benefits of Conserving Biodiversity, 7 pm (D)

MAY 2015

May 16 High Plains Environmental Center (HPEC) Native Plant Sale, Loveland
May 30 CoNPS Board Meeting, Regis U. Library, Denver

JULY 2015

July 24-26 Camp Out Field Trip (D)

AUGUST 2015

Aug. 8 CoNPS Board Meeting, Regis U. Library, Denver
Aug. 28-30 Sedges of Colorado Advanced Workshop & Field Trip - Tony Reznicek, Rocky Mountain Biological Laboratory, Gothic, CO

SEPTEMBER 2015

Sept. 11-13 CoNPS Annual Conference & Annual Colorado Rare Plant Symposium, American Mountaineering Center, Golden, CO

OCTOBER 2015

Oct. 24 CoNPS Board Meeting, Regis U. Library, Denver

KEY

B	Boulder Chapter	N	Northern Chapter
GR	Gore Range Chapter	P	Plateau Chapter
MD	Metro-Denver Chapter	SE	Southeast Chapter
		SJ	San Juan/4 Corners